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NATIONAL DAM SAFETY PROGRAM. MILLSBORO POND DAM, (DE00018), DEL--ETC(U)
DEC 79 J J WILLIAMS DACW61-78-C-0052

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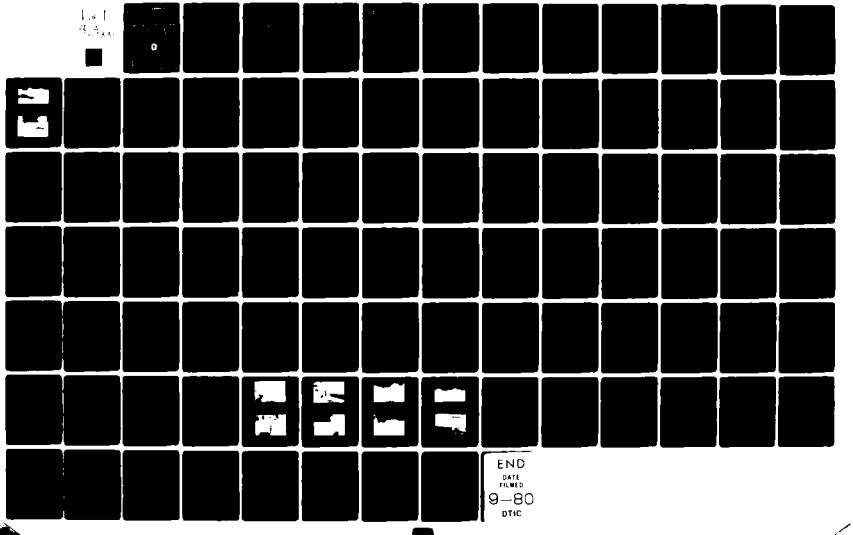

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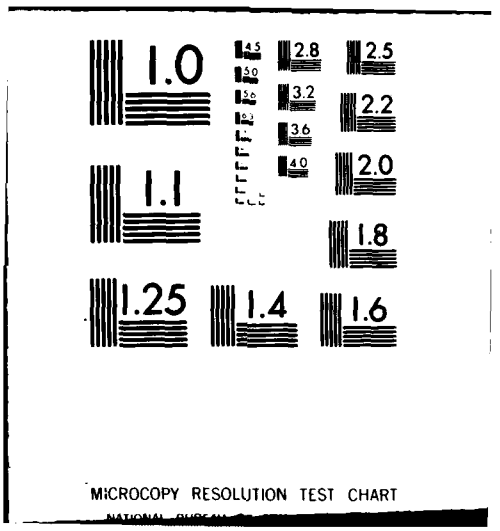
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LEVEL II

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DELAWARE RIVER BASIN
INDIAN RIVER, SUSSEX COUNTY
DELAWARE

MILLSBORO POND DAM

DE 00018

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PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

December, 1979

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REPORT DOCUMENTATION PAGE

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3. RECIPIENT'S CATALOG NUMBER

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Suite 1760 JFK Blvd.
Phila. Pa. 19103

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

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Riprap
Visual inspection
Structural analysis
National Dam Safety Program
Millsboro Pond Dam, DE

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

REPLY REFER TO
NAPEN-N

25 JUN 1980

Honorable Pierre S. DuPont
Governor of Delaware
Dover, Delaware 19901

Dear Governor DuPont:

Inclosed is the Phase I Inspection Report for Millsboro Pond Dam in Sussex County, Delaware which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in front of the report.

Based on visual inspection, available records, calculations and past operational performance, Millsboro Pond Dam, a high hazard potential structure, is judged to be in poor overall condition. The dam's spillway is considered inadequate because a flow equivalent to six percent of the Spillway Design Flood -SDF- would cause the dam to be overtopped. (The SDF, in this instance, is the Probable Maximum Flood.) The decision to consider the spillway "inadequate" instead of "seriously inadequate" is based on the determination that dam failure from overtopping would not significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within three months from the date of approval of this report, engineering studies and analyses should be initiated to determine the dam's embankment condition and structural stability. This should include subsurface investigations to determine material properties relative to stability and seepage. Any remedial measures found necessary should be initiated within calendar year 1980.

c. The following remedial actions should be initiated within three months from the date of approval of this report:

(1) Riprap should be placed on the upstream slope from the drawdown level (Elev. 0.75) to the top of the dam to protect against erosion.

(2) The vegetation on the downstream slope should be cut. Any bushes or small trees should be removed from the embankment.

(3) A regular maintenance program should be developed and implemented.

(4) A downstream warning system should be developed. During periods of heavy rainfall, the dam should be monitored and downstream residents should be alerted in the event of impending failure.

(5) An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency.

A copy of the report is being furnished to Mr. John E. Wilson III, Delaware Department of Natural Resources and Environmental Control, the designated State Office contact for this Program. Within five days of the date of this letter, a copy will also be sent to Congressman Thomas B. Evans. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, thirty days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia, 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies Furnished:
Mr. John E. Wilson III, Acting Secretary
Department of Natural Resources and
Environmental Control
Edward Tatnall Bldg.
Dover, DE 19901

Mr. William R. Ratledge, Director
Division of Soil & Water Conservation
DDNR & EC
Dover, DE 19901

MILLSBORO POND DAM (DE00018)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 27 September 1979 by O'Brien & Gere Engineers, Inc., under contract to the U.S. Army Engineer District, Philadelphia in accordance with the National Dam Inspection Act, Public Law 92-367.

Millsboro Pond Dam, a high hazard potential structure, is judged to be in poor overall condition. The dam's spillway is considered inadequate because a flow equivalent to six percent of the Spillway Design Flood -SDF- would cause the dam to be overtopped. (The SDF, in this instance, is the Probable Maximum Flood.) The decision to consider the spillway "inadequate" instead of "seriously inadequate" is based on the determination that dam failure from overtopping would not significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

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(5) An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 24 JUN 1980

DELAWARE RIVER BASIN

Name of Dam: Millsboro Pond Dam
County & State: Sussex County, Delaware
Inventory Number: DE 00018

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

APPROVED FOR PUBLIC RELEASE;
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Prepared by:

O'BRIEN & GERE ENGINEERS, INC.
JUSTIN & COURTNEY DIVISION

For

DEPARTMENT OF THE ARMY
Philadelphia District, Corps of Engineers
Custom House-2nd & Chestnut Streets
Philadelphia, PA 19106

410760

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and anlayses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data availabe to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Millsboro Pond Dam	ID # DE 00018
State Located:	Delaware	
County Located:	Sussex	
Stream:	Indian River	
Coordinates:	Latitude 38^{o} 35.7', Longitude 75^{o} 17.5'	
Date of Inspection:	September 27, 1979	

ASSESSMENT

Based on visual observations made during the date of the inspection, information made available by the Delaware Department of Natural Resources and Environmental Control (DNREC), and conversations with the owner's representative, Millsboro Pond Dam (owned by the Delaware State Highway Department) is considered to be in overall poor condition. A partial failure of the dam occurred in February of 1979. On the date of the inspection, it was apparent that temporary repairs had been effected.

The dam is a homogeneous earth embankment approximately 400 feet in length with a maximum height of about 12 feet. The embankment appears to be composed entirely of a relatively pervious material (sandy soil) with no seepage barriers or erosion protection. The upstream slope has eroded to an approximate slope of 1 horizontal to 2 vertical (1H:2V) and appears to be unstable. The downstream slope is overgrown with vegetation.

The recommended Spillway Design Flood (SDF) for this Intermediate size, High hazard dam is the Probable Maximum Flood (PMF). Examination of the results of the hydrologic and hydraulic analyses indicates that the spillway is capable of discharging approximately 5 percent of the SDF prior to overtopping of the embankment. Therefore, the spillway is classified as "Inadequate," but not "Seriously Inadequate" because a failure of the dam would not appear to cause a significant increase in hazard to loss of life downstream.

Recommendations and remedial measures which should be initiated immediately are as follows:

a. *Facilities*

1. Detailed hydrologic and hydraulic analyses should be performed to determine the need and type of mitigating measures necessary. These analyses should include an assessment of the downstream hazard potential that would result from a failure of the dam with tidal conditions taken into account.

2. Seepage and stability analyses for the embankment should be performed to establish what remedial measures may be necessary to render the embankment safe. The required remedial measures should be constructed following the completion of the analyses.

3. Riprap should be placed on the upstream slope from the drawdown level (Elev. 0.75) to the top of the dam to protect against erosion.

4. The vegetation on the downstream slope should be cut. Any bushes or small trees should be removed from the embankment.

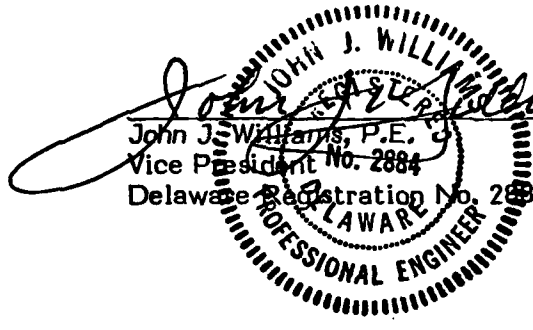
b. Operation and Maintenance Procedures

1. A regular maintenance program should be developed and implemented.

2. A downstream warning system should be developed. During periods of heavy rainfall, the dam should be monitored and downstream residents should be alerted in the event of an impending failure.

3. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency.

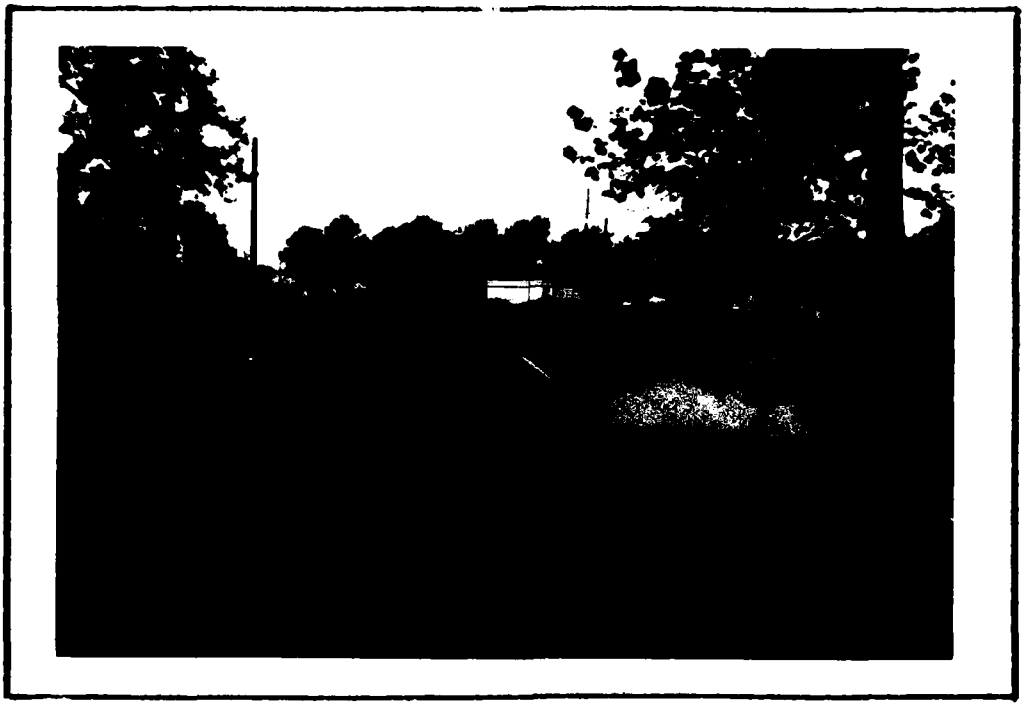
O'BRIEN & GERE ENGINEERS, INC.



John J. Williams, P.E.
Vice President
Delaware Registration No. 2884

Date: 8 FEB 1980

UPSTREAM FACE OF DAM
AND SPILLWAY SECTION 9-27-79



DOWNSTREAM FACE OF DAM 9-27-79

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
MILLSBORO POND DAM
INVENTORY NUMBER - DE 00018

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with contract # DACW 61-78-C-0052 between O'Brien & Gere Engineers and the United States Army Corps of Enginers, Philadelphia District.

b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic condition of Millsboro Pond Dam and appurtenant structures and to determine if the dam constitutes a hazard to human life or property.

1.2 Project Description (Based on information obtained from the Delaware Department of Natural Resources and Environmental Control (DNREC) Dover, Delaware).

a. Description of Dam and Appurtenances. Millsboro Pond Dam is a homogeneous earth embankment approximately 400 feet long with a maximum height of about 12 feet. A 4-lane highway (Delaware Route 24) forms the top of the embankment, which is approximately 60 feet wide.

The spillway is a concrete, sharp-crested weir with a semicircular configuration and a downstream face that is sloped 2H:1V (Refer to Figure 3 in Appendix E). The arc length of the spillway crest is 81.7 feet and the crest elevation is 4.75 (approximately 5.4 feet below the low point in the top of the dam). Stoplog gates that are 4 feet high and 5 feet wide are located at each end of the semicircular weir. Spillway discharge is directed into a 20-foot wide, 8.5-foot high opening (beneath the bridge) which extends approximately 60 feet through the base of the embankment.

The stoplog gates may be operated by hand wheels which are accessible from the top of the dam by means of concrete walkways.

b. Location. Millsboro Pond Dam is located on the Indian River in the town of Millsboro, Sussex County, Delaware. The site is in the northern portion of Millsboro, a community with a 1970 population of 1,073, and is shown on the USGS Quadrangle entitled, "Millsboro, Del" at coordinates N 38° 35.7', W 75° 17.5'. A regional location map of Millsboro Pond Dam is included as Figure 1 in Appendix E.

c. Size Classification. Millsboro Pond Dam has a maximum height of about 12 feet which would place it in the Small size dam category because it is less than 40 feet high. However, since it has a maximum storage capacity of approximately 1,475 acre-feet it is classified as an Intermediate size dam because it has greater than 1,000 acre-feet but less than 50,000 acre-feet maximum storage.

d. Hazard Classification. Three houses (with base elevations of approximately 5.0) are located on the left bank (looking downstream) of the Indian River and a playground is located on the right bank of the river immediately downstream of the dam. The Millsboro wastewater treatment plant is located downstream of the playground. A 4-lane highway (Delaware Route 24) is located across the top of the embankment. A failure of the dam would result in extensive property damage and possible loss of life. Therefore, the dam is classified in the High hazard category.

e. Ownership. Millsboro Pond Dam and its appurtenant structures are owned by the Delaware Department of Transportation, Division of Highways, Dover, Delaware, 19901. According to the owner's representative, the pond is owned by the town of Millsboro.

f. Purpose of Dam. The original purpose of the dam is unknown. The dam presently supports a 4-lane highway and the pond is used for recreation.

g. Design and Construction History. No information is available concerning the original design and construction of the dam. The current spillway system was designed in 1964 by the Delaware State Highway Department. Construction of the spillway was completed in 1966. Following the partial failure of the dam in February of 1979, temporary repairs to the embankment and highway were effected.

h. Normal Operating Procedures. According to Mr. John H. McWilliams, the Sussex County District Engineer for the Delaware State Highway Department, the stoplog gates are only operated to draw the reservoir down for maintenance of the dam or cleaning of the reservoir.

1.3 Pertinent Data

a. Drainage Area.

Square Miles	61.5

b. Discharge at Dam Site (cfs).

Spillway Capacity	1,190

c. Elevation (feet above MSL).

Spillway crest (normal pool)	4.75
Top of Dam (maximum pool)	10.0
Streambed at downstream toe of dam	-2.0 (est.)

d. Reservoir Length (miles).

Normal pool	1.1
Maximum pool	2.6

e. Storage (acre-feet).

Normal pool	375
Maximum pool	1,475

f. Reservoir Surface Area (acres).

Normal pool	105
Maximum pool	336

g. Dam Data.

Type	Earth
Length	400 feet
Height	12 feet
Top Width	60 feet
Side Slopes	Eroded to 1H:2V (upstream) 2H:1V (downstream)
Zoning	None
Impervious Core	None
Cutoff	Unknown
Grout Curtain	None

h. Spillway.

Type	Semicircular sharp-crested concrete weir with sloped downstream face and stoplog bays on both sides (see Figure 3 in Appendix E).
Crest Length	81.7 feet (arc distance)
Crest Elevation	4.75
Gates	A 4-foot high by 5-foot wide stoplog gate is located on each side of the spillway.
Upstream Channel	None
Downstream Channel	A 20-foot wide, 8.5-foot high opening beneath the bridge directs spillway discharge through the embankment for a distance of 60 feet where it outlets into the Indian River.

i. Outlet Works. The outlet works consist of the stop log gates which function as a part of the spillway when closed. These gates are operated by hand wheels that are accessible from the top of the dam by means of concrete walkways.

SECTION 2

ENGINEERING DATA

2.1 Design

a. Data Available. The engineering data made available by the Delaware DNREC consists of a set of 4 design drawings (dated 1964) for the new spillway and the highway.

b. Design Features. The principal design features for this structure are discussed in Section 1.2.a and shown on the drawings in Appendix E of this report.

2.2 Construction

No information relative to the original construction of the dam is available. The spillway system was redesigned and reconstructed between 1964 and 1966.

2.3 Operation

Operational features are limited to the stoplog gates located at each end of the spillway. The reservoir may be drawn down four feet for maintenance purposes by operating these gates However, the normal high tide elevation of the Indian River (2.5) limits the depth of drawdown during high tide to 2.25 feet below the spillway crest.

2.4 Evaluation

a. Availability. All information made available was provided by DNREC. No information is available concerning the embankment and foundation materials.

b. Adequacy. The information made available by DNREC, conversations with the Owner's representative, and observations made during the field investigation provided adequate data for a Phase I evaluation.

c. Validity. There is no reason to question the validity of the data provided by DNREC.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The field inspection of Millsboro Pond Dam took place on September 27, 1979. At the time of the inspection, the stoplog gates had been removed and the reservoir water surface was approximately 3.8 feet below the spillway crest elevation. No underwater areas were inspected. The observations and comments of the field inspection team are in the checklist which is Appendix B of this report. The appearance of the facility indicates that the dam and its appurtenances are marginally maintained.

b. Dam. On the date of the inspection, the reservoir level was approximately 3.8 feet below the spillway crest elevation due to a recent failure of the embankment. According to Mrs. Thelma Monroe, the Mayor of Millsboro, a partial failure of the dam occurred in February of 1979 during non-overtopping conditions. The apparent cause of failure was piping through the embankment. The dam has been temporarily repaired since the failure, and a temporary road and bridge have been constructed to accommodate the motor vehicle traffic. Observation of the exposed portion of the breached section indicates that the entire embankment was constructed with a relatively pervious (sandy) material.

The upstream face of the embankment to the left of the spillway (looking downstream) has been eroded to a rather steep slope of aproximately 1H:2V and appears to be unstable. The downstream face of the embankment has an approximate slope of 2H:1V and is overgrown with vegetation.

c. Appurtenant Structures. The spillway system appears to be in good condition. According to Mr. McWilliams, the Owner's respresentative, the stoplog gates were removed subsequent to the failure of the embankment in order to draw down the reservoir.

Two pipes that appear to be located longitudinally through the embankment extend above the top of the dam across the spillway section. According to Mr. McWilliams, the larger of these pipes (12-inch diameter) is a sewer line from a nearby hospital and the smaller pipe (5-inch diameter) is a telephone line from the same hospital. Both pipes were installed less than 10 years ago.

d. Reservoir Area. There is no evidence of excessive siltation, slope instability, or other features that would adversely affect the storage capacity of the reservoir. The slopes along the perimeter of the reservoir are vegetated and on gentle gradients of less than 10 percent.

e. Downstream Channel. The downstream channel is the Indian River which outlets into the Indian River Bay which, in turn outlets into the Atlantic Ocean. Three homes are located along the left bank of the river and a playground and a wastewater treatment plant on the right bank of the river which could be subject to flooding.

SECTION 4

OPERATIONAL FEATURES

4.1 Procedures

The Owner's Respresentative stated that the stoplog gates had been operated occasionally in the past for maintenance purposes. However, the stoplog gates have been removed since the partial failure of the dam and no operating procedures are currently in effect.

4.2 Maintenance of the Dam

According to the Owner's Respresentative, maintenance of Millsboro Pond Dam is the responsibility of the Sussex County office of the Delaware State Highway Department, located in Georgetown. However, no established maintenance program has been established.

4.3 Maintenance of Operating Facilities

The only operating facilities associated with this dam are the stoplog gates which have been temporarily removed.

4.4 Description of any Warning System in Effect

No warning systems are in effect at this site.

4.5 Evaluation of Operational Adequacy

A regular maintenance program should be developed and implemented by the Owner.

A downstream warning system should be developed. The dam should be monitored during periods of heavy rainfall, and downstream residents should be alerted in the event of an impending failure.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. No hydrologic or hydraulic design data was provided by DNREC. The design drawings provided spillway dimensions and characteristics upon which the hydraulic calculations in this report were based.

Millsboro Pond has a drainage area of 61.5 square miles. The spillway has an estimated discharge capacity of 1,190 cfs.

For further information, refer to the computations, data, and computer printout included in Appendix C of this report.

b. Experience Data. No rainfall or reservoir level records are maintained for this dam. The maximum reservoir elevation of record is not known.

c. Visual Observations. On the date of the inspection, the spillway did not appear to be susceptible to blockage from debris.

d. Overtopping Potential. The Spillway Design Flood (SDF) for this "Intermediate" size, "High" hazard structure is the Probable Maximum Flood (PMF). The SDF was synthesized from the Probable Maximum Precipitation using the Snyder unit hydrograph. Hydrograph coefficients for this site were obtained from the Philadelphia District, Corps of Engineers. The SDF hydrograph was routed through the reservoir with the initial water surface elevation at the spillway crest. The peak inflow and outflow rates for the SDF were determined to be 41,492 cfs and 40,266 cfs respectively. The spillway is capable of discharging approximately 5 percent of the SDF prior to overtopping of the embankment (refer to Appendix C for computations and the computer printout).

e. Spillway Adequacy. The spillway is considered "Inadequate" since it is incapable of discharging the PMF. The area downstream of the dam consists of a wide tidal area and it appears that the water surface elevations produced by a dam breach resulting from overtopping conditions should not significantly affect the non-breach water surface elevations downstream of the dam.

f. Emergency Drawdown. The reservoir can be drawn down from normal pool (Elev. 4.75) to the base of the stoplog gates (Elev. 0.75) in approximately 45 hours, or about 2 days (see Appendix C for calculations).

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The embankment appears to have been constructed with a relatively pervious material (sandy soil) with no seepage barriers or erosion protection provided. Therefore, the dam would be highly susceptible to piping through the embankment and erosion of the upstream face due to wave action. The breach that occurred in February of 1979 appears to be the result of seepage through the embankment. In addition, the upstream face (to the left of the spillway looking downstream) has been eroded to an approximate slope of 1H:2V and appears to be unstable.

The downstream slope of the embankment appears to be stable. However, the thick overgrowth of vegetation creates numerous potential seepage paths and hinders a detailed investigation of the condition of the slope.

b. Design and Construction Data. The spillway system appears to have been constructed in general conformance with the 1964 design drawings. No information is available concerning the design and construction of the original embankment.

c. Operating Records. There are no known operating records for Millsboro Pond Dam.

d. Post Construction Changes. The spillway system was redesigned and reconstructed between 1964 and 1966. No record of any other post construction changes is available.

e. Seismic Stability. Millsboro Pond Dam is located in Seismic Zone 1 of the "Seismic Zone Map of Contiguous States." A dam located in Seismic Zone 1 is generally considered to be safe under expected Zone 1 earthquake loading conditions if it is stable under static loading conditions. Seepage and stability analyses are recommended for this site to determine static stability.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, & PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety. The visual observations indicate that the embankment portion of the Millsboro Pond Dam is in poor condition. The deficiencies and problem areas noted in Section 6.1.a are indicative of an inadequate design of the original dam as well as a general lack of maintenance.

The spillway is capable of discharging 5 percent of the SDF prior to overtopping of the embankment. Therefore, the spillway is classified as "Inadequate," but not "Seriously Inadequate" because a failure of the dam would not appear to cause a significant incrase in hazard to loss of life downstream.

b. Adequacy of Information. The information made available by DNREC, conversations with the Owner's Representative, and observations made during the field investigation provided adequate data for a Phase I evalution.

c. Urgency. The remedial measures recommended in Section 7.2 should be initiated immediately.

d. Necessity for Further Investigation. Further investigations should be performed in accordance with 7.2.a, numbers 1 and 2.

7.2 Recommendations and Proposed Remedial Measures

a. Facilities.

1. Detailed hydrologic and hydraulic analyses should be performed to determine the need and type of mitigating measures necessary. These analyses should include an assessment of the downstream hazard potential that would result from a failure of the dam with tidal conditions taken into account.

2. Seepage and stability analyses for the embankment should be performed to establish what remedial measures may be necessary to render the embankment safe. The required remedial measures should be constructed following the completion of the analyses.

3. Riprap should be placed on the upstream slope from the drawdown level (Elev. 0.75) to the top of the dam to protect against erosion.

4. The vegetation on the downstream slope should be cut. Any bushes or small trees should be removed from the embankment.

b. Operation and Maintenance Procedures

1. A regular maintenance program should be developed and implemented.

2. A downstream warning system should be developed. During periods of heavy rainfall, the dam should be monitored and downstream residents should be alerted in the event of an impending failure.

3. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency.

APPENDIX

A

Check List Engineering Data

Design, Construction, Operation

Phase I

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Millsboro Pond Dam

ID # DE 00018

ITEM	REMARKS
AS-BUILT DRAWINGS	Four As-Built Drawings were provided by DNREC and are included in APPENDIX E. as figures 2,3,4, and 5.
REGIONAL VICINITY MAP	A regional vicinity map is included in APPENDIX E as figure 1
CONSTRUCTION HISTORY	No construction history information is available.
TYPICAL SECTIONS OF DAM	No embankment cross-sections are available.
OUTLETS - PLAN	There is no system of outlet works for this dam.
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	None Available .
RAINFALL/RESERVOIR RECORDS	None Available.

ITEM	REMARKS
DESIGN REPORTS	None Available
GEOLOGY REPORTS	None Available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None Available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Records of several boreholes are included on Figure 3 in Appendix E.
POST-CONSTRUCTION SURVEYS OF DAM	The As-Built Highway elevations are included on Figure 2 in Appendix E.
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	NONE
MODIFICATIONS	Plans and Details for the current spillway system, which was designed in 1964, are included in Appendix E as Figures 2,3,4 and 5.
HIGH POOL RECORDS	None available.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	A breach occurred in February of 1979, but there are no description reports available.
MAINTENANCE OPERATION RECORDS	None available.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	The spillway plans, sections, and details are included in Appendix E as Figures 2,3,4. and 5.
OPERATING EQUIPMENT PLANS & DETAILS	Stop Log Gate Plans are also included on Figures 3,4, and 5 in Appendix E.
MISCELLANEOUS	Figures 2,3,4, and 5 in Appendix E were the only information obtained from DNREC.

APPENDIX

B

Check List

Visual Inspection

Phase I

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam Millsboro Pond Dam County Sussex State Delaware National ID # DE 00018

Type of Dam Earth Hazard Category High

Date(s) Inspection Sept. 27, 1979 Weather Cloudy Temperature 65° F

Pool Elevation at Time of Inspection 1.0 M.S.L. Tailwater at Time of Inspection 1.0± M.S.L.

Inspection Personnel:

John J. Williams Leonard Beck Robert Bowers

John J. Williams Recorder

Remarks:

Mr. Krishna Patel, Delaware DNREC, Mrs. Thelma Monroe, Mayor of Millsboro, Mr. Charles West, Delaware State Representative, and Mr. Gene Campbell, County Democratic Chairman for Sussex County, were also present during the inspection.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Several cracks were apparent in the embankment as a result of the breach in the dam.	The embankment must be repaired.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	The upstream slope to the left of the spillway has been severely eroded and appears to be unstable.	The upstream slope should be reconstructed and provided with riprap to protect against erosion.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	There were no points surveyed along the crest of the dam that were below design elevation.	
RIPRAP FAILURES	There was no riprap observed.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
DRAINS	The reservoir may be drawn down from normal pool by means of the stop log gates adjacent to the spillway. The gates had been removed following the breach and were not in place during the inspection.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No problems observed.	
ANY NOTICEABLE SEEPAGE	None observed. However, the breach appeared to be a result of piping through the embankment.	A method of controlling seepage should be provided.
STAFF GAGE AND RECORDER	None.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The weir appeared to be in good condition.	
APPROACH CHANNEL	None	
DISCHARGE CHANNEL	Spillway discharge flows through a box culvert beneath the highway, then into the Indian River. The culvert appeared to be in good condition.	
BRIDGE AND PIERS	None	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Water was flowing over the concrete sill during the inspection since the stoplog gates had been removed. No problems were observed.	
APPROACH CHANNEL	None	
DISCHARGE CHANNEL	Same as for ungated spillway.	
BRIDGE AND PIERS	None	
GATES AND OPERATION EQUIPMENT	The stoplog gates and operating hand wheels were removed from the structure following the breaching of the embankment in February of 1979.	

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	The survey of the crest of the dam revealed no settlement problems	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	There was no evidence of instability of the reservoir slopes.	
SEDIMENTATION	There was no indication of excessive sedimentation in the reservoir.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel is the Indian River which is quite wide. It is unlikely that the river could ever become obstructed.	
SLOPES	The Indian River outlets into the Indian River Bay which joins the Atlantic Ocean and its banks are relatively flat.	
APPROXIMATE NO. OF HOMES AND POPULATION	There are three homes and approximately 15 people within the potential flood zone that would result from a failure of the embankment.	

APPENDIX

C

Hydrologic & Hydraulic Data

TABLE OF CONTENTS - APPENDIX C

HYDRAULICS & HYDROLOGY

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
MILLSBORO POND DAM	1	RRB		

HYDROLOGY CALCULATIONS

DRAINAGE AREA (PLANIMETERED FROM USGS QUAD SHEETS): 61.5 SQ. MI.

PMP CALCULATIONS (HMR 33)

AREA IS IN ZONE 6

24 HR., 200 SQ. MI. RAINFALL = 25 INCHES

HR.	%	RAINFALL	Δ RF
6	95	23.8"	23.8"
12	104	26.0"	2.2"
24	114	28.5"	2.5"
48	126	31.5"	3.0"

SNYDER COEFFICIENTS

INFORMATION PROVIDED BY PHILA. COE:

$C_t = 3.0$, $\boxed{C_p = 0.5}$

$$t_p = C_t (L \cdot L_{ca})^{0.3}$$

FROM QUAD SHEET:

$L = 9.85$ MILES, $L_{ca} = 4.92$ MILES

$$t_p = 3.0 (9.85 \cdot 4.92)^{0.3} = \boxed{9.6 \text{ HOURS}}$$

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
MILLSBORO POND DAM	2	RRB		

RESERVOIR SURFACE AREAS (PLANIMETERED FROM USGS SHEETS)

ELEV.	SURF. AREA (ACRES)
6 (USGS NORMAL POOL - 1954)	119.4
10	336.1
20	642.8
4.75 (NORMAL POOL - POST 1964)	104.5

HYDRAULICS

THE SPILLWAY IS A TRIANGULAR SECTION WITH A VERTICAL UPSTREAM FACE AND A 2H:1V DOWNSTREAM FACE.

$$Q_s = CLH^{3/2}$$

FROM KING & BRATER'S HANDBOOK OF HYDRAULICS, PAGE 5-48, TABLE 5-7:

$$C = 3.54$$

THE CREST LENGTH IS SEMI-CIRCULAR IN SHAPE WITH A RADIUS OF 26 FEET.

THEREFORE, $L = 2\pi R/2 = 81.7$ FEET

$$Q_s = 289.2\, H_s^{3/2}$$

ADDITIONAL FLOW WILL TAKE PLACE OVER THE STOP LOGS AT EITHER END OF THE SPILLWAY CREST (10')

$C_{SL} = 3.1$ ∴ THE EFFECTIVE LENGTH OVER THE STOPLOGS IS $3.1/3.54 \times 10' \approx 8.5'$ & $L_{TOTAL} \approx 90'$

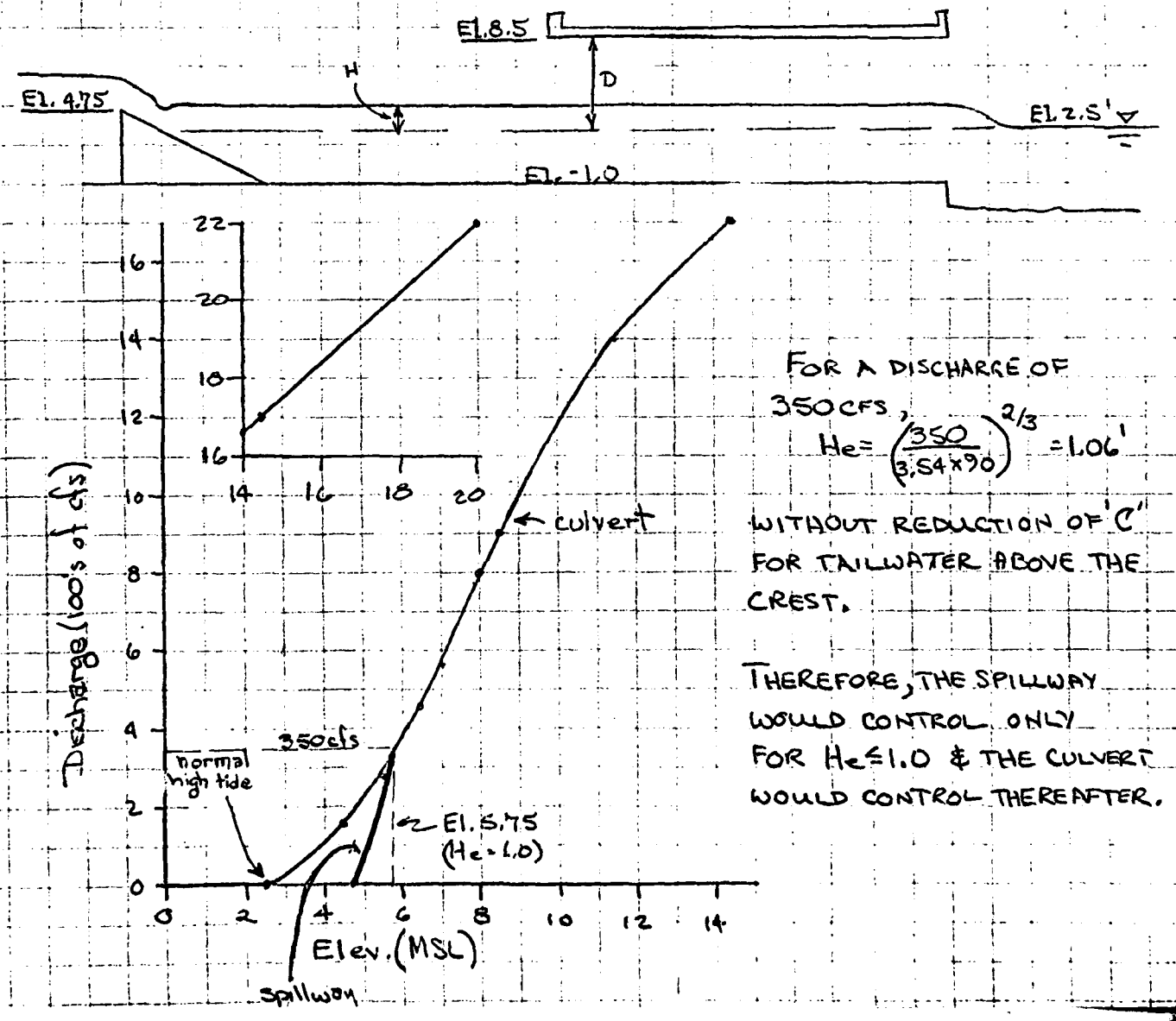
O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
MILLSBORO POND DAM	3	DBC		

CULVERT DISCHARGE RATING

THE CULVERT DISCHARGE RATING WAS DEVELOPED FROM FIG. 17-29 OF OPEN CHANNEL HYDRAULICS, V.T. CHOW, P. 498.

THE CULVERT WAS ANALYZED ASSUMING A NORMAL HIGH TIDE ELEVATION OF 2.5' (FROM FIGURE 3 OF THIS TEXT). THE EFFECTIVE CULVERT OPENING WAS ASSUMED AS THE AREA ABOVE THE HIGH TIDE ELEVATION.



FOR A DISCHARGE OF 350 CFS,

$$He = \left(\frac{350}{3.54 \times 90}\right)^{2/3} = 1.06'$$

WITHOUT REDUCTION OF 'C' FOR TAILWATER ABOVE THE CREST.

THEREFORE, THE SPILLWAY WOULD CONTROL ONLY FOR $He \leq 1.0$ & THE CULVERT WOULD CONTROL THEREAFTER.

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
MILLSBORO POND DAM	4	DBC/RRB		

STAGE - DISCHARGE

STAGE (FT. - MSL)	DISCHARGE (CFS)
4.75	0
5.75	350
6.50	460
7.00	570
8.00	800
9.00	1000
10.00	1190
11.00	1340
12.00	1470
13.00	1550
14.00	1660
20.00	2200

DRAWDOWN TIME

DRAWDOWN FROM NORMAL POOL WOULD BE THROUGH THE TWO STOPLOG GATES. MAXIMUM DRAWDOWN = 4.0 FT. FROM THE SPILLWAY CREST (TO ELEV. 0.75).

DISCHARGE $Q = CLH^{3/2}$ (ASSUME WEIR FLOW) $C = 3.0$ $L = 10$ FT. (TWO GATES)

H VARIES FROM 4 FT. TO 0 FT.

STORAGE IS DETERMINED FOR EACH ELEVATION BY THE CONIC METHOD,

$$V = \frac{H}{3}\left(\sqrt{A_1 A_2} + A_1 + A_2\right)$$

USING AN APPROXIMATE RESERVOIR AREA OF 1 ACRE AT ELEVATION -2. POOL AREA AT EACH ELEVATION WAS ESTIMATED BY INTERPOLATING BETWEEN THE NORMAL POOL AREA OF 105 ACRES AND THE AREA AT ELEV. -2.

DRAWDOWN TIME WAS ESTIMATED FOR EACH FOOT OF DRAWDOWN, BY DIVIDING THE STORAGE DIFFERENTIAL BY THE AVERAGE DISCHARGE RATE FOR EACH PERIOD

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
MILLSBORO POND DAM	4A	RRE		

ELEV.	H (FT.)	Q (CFS)	$Q_{AVG.}$	STORAGE (A-F)	Δ STORAGE	TIME (HRS.)
4.75	4	240		260		
			198		98	6.0
3.75	3	156		162		
			121		68	6.8
2.75	2	85		94		
			58		46	9.6
1.75	1	30		48		
			15		28	22.6
0.75	0	0		20		

ΣTIME = 45 HRS.

THE DRAWDOWN TIME FROM THE SPILLWAY CREST TO THE BASE OF THE STOPLOG GATES (ELEV. 0.75) IS ABOUT 45 HOURS, OR 2 DAYS.

HOWEVER, NORMAL HIGH TIDE ELEVATION IS ELEV. 2.5 SO THAT A DRAWDOWN TO ELEV. 0.75 WOULD ONLY LAST FOR A FEW HOURS BEFORE THE TIDAL FLOW REFILLED THE RESERVOIR (TO ELEV. 2.5).

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE0 09/28/79.
     TIME0 13.18.00.
```

NATIONAL DAM INSPECTION PROGRAM
MILLSBORO POND DAM
PMF HYDROLOGY

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	30	0	0	0	0	0	3	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= .05 .10 .15 .20 .25 .30 .40 .50 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

RUNOFF TO MILLSBORO POND

	ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
INFLOW	0	0	0	0	0	1	0	0	

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	61.50	0.00	61.50	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	25.00	95.00	104.00	114.00	126.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .855

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.50	.15	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 9.60 CP= .50 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC=19.97 AND R=26.00 INTERVALS

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 9.61 HOURS, CP= .50 VOL= .97

24.	90.	186.	302.	432.	575.	727.	888.	1056.	1229.
1402.	1562.	1704.	1827.	1932.	2017.	2083.	2126.	2145.	2139.
2072.	1993.	1918.	1846.	1776.	1709.	1645.	1583.	1523.	1465.
1410.	1357.	1306.	1256.	1209.	1163.	1119.	1077.	1037.	997.

SH 5

960.	924.	889.	855.	823.	792.	762.	733.	706.	679.
653.	629.	605.	582.	560.	539.	519.	499.	480.	462.
445.	428.	412.	396.	381.	367.	353.	340.	327.	315.
303.	291.	280.	270.	260.	250.	240.	231.	223.	214.
206.	198.	191.	184.	177.	170.	164.	157.	151.	146.
140.	135.	130.	125.	120.	116.	111.	107.	103.	99.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.30	1	.01	0.00	.01	86.	1.04	3.30	151	0.00	0.00	0.00	5811.
1.01	1.00	2	.01	0.00	.01	80.	1.04	4.00	152	0.00	0.00	0.00	5592.
1.01	1.30	3	.01	0.00	.01	75.	1.04	4.30	153	0.00	0.00	0.00	5381.
1.01	2.00	4	.01	0.00	.01	70.	1.04	5.00	154	0.00	0.00	0.00	5178.
1.01	2.30	5	.01	0.00	.01	65.	1.04	5.30	155	0.00	0.00	0.00	4983.
1.01	3.00	6	.01	0.00	.01	61.	1.04	6.00	156	0.00	0.00	0.00	4795.
1.01	3.30	7	.01	0.00	.01	57.	1.04	6.30	157	0.00	0.00	0.00	4614.
1.01	4.00	8	.01	0.00	.01	53.	1.04	7.00	158	0.00	0.00	0.00	4440.
1.01	4.30	9	.01	0.00	.01	49.	1.04	7.30	159	0.00	0.00	0.00	4272.
1.01	5.00	10	.01	0.00	.01	46.	1.04	8.00	160	0.00	0.00	0.00	4111.
1.01	5.30	11	.01	0.00	.01	43.	1.04	8.30	161	0.00	0.00	0.00	3956.
1.01	6.00	12	.01	0.00	.01	40.	1.04	9.00	162	0.00	0.00	0.00	3791.
1.01	6.30	13	.02	0.00	.02	37.	1.04	9.30	163	0.00	0.00	0.00	3639.
1.01	7.00	14	.02	0.00	.02	35.	1.04	10.00	164	0.00	0.00	0.00	3494.
1.01	7.30	15	.02	0.00	.02	33.	1.04	10.30	165	0.00	0.00	0.00	3354.
1.01	8.00	16	.02	0.00	.02	30.	1.04	11.00	166	0.00	0.00	0.00	3219.
1.01	8.30	17	.02	0.00	.02	28.	1.04	11.30	167	0.00	0.00	0.00	3090.
1.01	9.00	18	.02	0.00	.02	26.	1.04	12.00	168	0.00	0.00	0.00	2965.
1.01	9.30	19	.02	0.00	.02	25.	1.04	12.30	169	0.00	0.00	0.00	2845.
1.01	10.00	20	.02	0.00	.02	23.	1.04	13.00	170	0.00	0.00	0.00	2729.
1.01	10.30	21	.02	0.00	.02	22.	1.04	13.30	171	0.00	0.00	0.00	2618.
1.01	11.00	22	.02	0.00	.02	20.	1.04	14.00	172	0.00	0.00	0.00	2511.
1.01	11.30	23	.02	0.00	.02	19.	1.04	14.30	173	0.00	0.00	0.00	2327.
1.01	12.00	24	.02	0.00	.02	17.	1.04	15.00	174	0.00	0.00	0.00	2149.
1.01	12.30	25	.11	0.00	.11	16.	1.04	15.30	175	0.00	0.00	0.00	1990.
1.01	13.00	26	.11	0.00	.11	15.	1.04	16.00	176	0.00	0.00	0.00	1857.
1.01	13.30	27	.13	0.00	.13	14.	1.04	16.30	177	0.00	0.00	0.00	1733.
1.01	14.00	28	.13	0.00	.13	13.	1.04	17.00	178	0.00	0.00	0.00	1616.
1.01	14.30	29	.16	0.00	.16	12.	1.04	17.30	179	0.00	0.00	0.00	1508.
1.01	15.00	30	.16	0.00	.16	12.	1.04	18.00	180	0.00	0.00	0.00	1407.
1.01	15.30	31	.19	0.00	.19	11.	1.04	18.30	181	0.00	0.00	0.00	1313.
1.01	16.00	32	.62	.35	.27	18.	1.04	19.00	182	0.00	0.00	0.00	1225.
1.01	16.30	33	.15	.07	.08	42.	1.04	19.30	183	0.00	0.00	0.00	1143.
1.01	17.00	34	.15	.07	.08	82.	1.04	20.00	184	0.00	0.00	0.00	1066.
1.01	17.30	35	.12	.04	.08	135.	1.04	20.30	185	0.00	0.00	0.00	995.
1.01	18.00	36	.12	.04	.08	199.	1.04	21.00	186	0.00	0.00	0.00	928.
1.01	18.30	37	.01	0.00	.01	273.	1.04	21.30	187	0.00	0.00	0.00	866.
1.01	19.00	38	.01	0.00	.01	355.	1.04	22.00	188	0.00	0.00	0.00	808.
1.01	19.30	39	.01	0.00	.01	443.	1.04	22.30	189	0.00	0.00	0.00	754.
1.01	20.00	40	.01	0.00	.01	536.	1.04	23.00	190	0.00	0.00	0.00	704.
1.01	20.30	41	.01	0.00	.01	633.	1.04	23.30	191	0.00	0.00	0.00	656.
1.01	21.00	42	.01	0.00	.01	732.	1.05	0.00	192	0.00	0.00	0.00	613.
1.01	21.30	43	.01	0.00	.01	827.	1.05	.30	193	0.00	0.00	0.00	572.
1.01	22.00	44	.01	0.00	.01	915.	1.05	1.00	194	0.00	0.00	0.00	533.
1.01	22.30	45	.01	0.00	.01	995.	1.05	1.30	195	0.00	0.00	0.00	498.
1.01	23.00	46	.01	0.00	.01	1065.	1.05	2.00	196	0.00	0.00	0.00	464.
1.01	23.30	47	.01	0.00	.01	1124.	1.05	2.30	197	0.00	0.00	0.00	433.
1.02	0.00	48	.01	0.00	.01	1172.	1.05	3.00	198	0.00	0.00	0.00	404.
1.02	.30	49	.07	0.00	.07	1208.	1.05	3.30	199	0.00	0.00	0.00	377.
1.02	1.00	50	.07	0.00	.07	1231.	1.05	4.00	200	0.00	0.00	0.00	352.
1.02	1.30	51	.07	0.00	.07	1236.	1.05	4.30	201	0.00	0.00	0.00	328.
1.02	2.00	52	.07	0.00	.07	1221.	1.05	5.00	202	0.00	0.00	0.00	306.

SH 6

1.02	2.30	53	.07	0.00	.07	1190.	1.05	5.30	203	0.00	0.00	0.00	286.
1.02	3.00	54	.07	0.00	.07	1156.	1.05	6.00	204	0.00	0.00	0.00	267.
1.02	3.30	55	.07	0.00	.07	1114.	1.05	6.30	205	0.00	0.00	0.00	249.
1.02	4.00	56	.07	0.00	.07	1073.	1.05	7.00	206	0.00	0.00	0.00	232.
1.02	4.30	57	.07	0.00	.07	1033.	1.05	7.30	207	0.00	0.00	0.00	217.
1.02	5.00	58	.07	0.00	.07	994.	1.05	8.00	208	0.00	0.00	0.00	202.
1.02	5.30	59	.07	0.00	.07	956.	1.05	8.30	209	0.00	0.00	0.00	189.
1.02	6.00	60	.07	0.00	.07	920.	1.05	9.00	210	0.00	0.00	0.00	176.
1.02	6.30	61	.16	.09	.08	887.	1.05	9.30	211	0.00	0.00	0.00	164.
1.02	7.00	62	.16	.09	.08	861.	1.05	10.00	212	0.00	0.00	0.00	153.
1.02	7.30	63	.16	.09	.08	845.	1.05	10.30	213	0.00	0.00	0.00	143.
1.02	8.00	64	.16	.09	.08	840.	1.05	11.00	214	0.00	0.00	0.00	133.
1.02	8.30	65	.16	.09	.08	847.	1.05	11.30	215	0.00	0.00	0.00	124.
1.02	9.00	66	.16	.09	.08	867.	1.05	12.00	216	0.00	0.00	0.00	116.
1.02	9.30	67	.16	.09	.08	902.	1.05	12.30	217	0.00	0.00	0.00	108.
1.02	10.00	68	.16	.09	.08	951.	1.05	13.00	218	0.00	0.00	0.00	101.
1.02	10.30	69	.16	.09	.08	1016.	1.05	13.30	219	0.00	0.00	0.00	94.
1.02	11.00	70	.16	.09	.08	1096.	1.05	14.00	220	0.00	0.00	0.00	88.
1.02	11.30	71	.16	.09	.08	1192.	1.05	14.30	221	0.00	0.00	0.00	82.
1.02	12.00	72	.16	.09	.08	1302.	1.05	15.00	222	0.00	0.00	0.00	77.
1.02	12.30	73	1.02	.94	.08	1446.	1.05	15.30	223	0.00	0.00	0.00	71.
1.02	13.00	74	1.02	.94	.08	1658.	1.05	16.00	224	0.00	0.00	0.00	67.
1.02	13.30	75	1.22	1.14	.08	1966.	1.05	16.30	225	0.00	0.00	0.00	62.
1.02	14.00	76	1.22	1.14	.08	2345.	1.05	17.00	226	0.00	0.00	0.00	58.
1.02	14.30	77	1.52	1.45	.08	2969.	1.05	17.30	227	0.00	0.00	0.00	54.
1.02	15.00	78	1.52	1.45	.08	3712.	1.05	18.00	228	0.00	0.00	0.00	51.
1.02	15.30	79	1.85	1.78	.08	4652.	1.05	18.30	229	0.00	0.00	0.00	47.
1.02	16.00	80	5.66	5.58	.08	5909.	1.05	19.00	230	0.00	0.00	0.00	44.
1.02	16.30	81	1.42	1.34	.08	7569.	1.05	19.30	231	0.00	0.00	0.00	41.
1.02	17.00	82	1.42	1.34	.08	9576.	1.05	20.00	232	0.00	0.00	0.00	38.
1.02	17.30	83	1.12	1.04	.08	11878.	1.05	20.30	233	0.00	0.00	0.00	36.
1.02	18.00	84	1.12	1.04	.08	14433.	1.05	21.00	234	0.00	0.00	0.00	33.
1.02	18.30	85	.11	.03	.08	17178.	1.05	21.30	235	0.00	0.00	0.00	31.
1.02	19.00	86	.11	.03	.08	20038.	1.05	22.00	236	0.00	0.00	0.00	29.
1.02	19.30	87	.11	.03	.08	22950.	1.05	22.30	237	0.00	0.00	0.00	27.
1.02	20.00	88	.11	.03	.08	25859.	1.05	23.00	238	0.00	0.00	0.00	25.
1.02	20.30	89	.11	.03	.08	28714.	1.05	23.30	239	0.00	0.00	0.00	24.
1.02	21.00	90	.11	.03	.08	31470.	1.06	0.00	240	0.00	0.00	0.00	22.
1.02	21.30	91	.11	.03	.08	33987.	1.06	.30	241	0.00	0.00	0.00	21.
1.02	22.00	92	.11	.03	.08	36136.	1.06	1.00	242	0.00	0.00	0.00	19.
1.02	22.30	93	.11	.03	.08	37882.	1.06	1.30	243	0.00	0.00	0.00	18.
1.02	23.00	94	.11	.03	.08	39444.	1.06	2.00	244	0.00	0.00	0.00	17.
1.02	23.30	95	.11	.03	.08	40513.	1.06	2.30	245	0.00	0.00	0.00	16.
1.03	0.00	96	.11	.03	.08	41193.	1.06	3.00	246	0.00	0.00	0.00	15.
1.03	.30	97	0.00	0.00	0.00	41492.	1.06	3.30	247	0.00	0.00	0.00	14.
1.03	1.00	98	0.00	0.00	0.00	41414.	1.06	4.00	248	0.00	0.00	0.00	13.
1.03	1.30	99	0.00	0.00	0.00	40952.	1.06	4.30	249	0.00	0.00	0.00	12.
1.03	2.00	100	0.00	0.00	0.00	40105.	1.06	5.00	250	0.00	0.00	0.00	11.
1.03	2.30	101	0.00	0.00	0.00	39011.	1.06	5.30	251	0.00	0.00	0.00	10.
1.03	3.00	102	0.00	0.00	0.00	37811.	1.06	6.00	252	0.00	0.00	0.00	10.
1.03	3.30	103	0.00	0.00	0.00	36543.	1.06	6.30	253	0.00	0.00	0.00	9.
1.03	4.00	104	0.00	0.00	0.00	35251.	1.06	7.00	254	0.00	0.00	0.00	8.
1.03	4.30	105	0.00	0.00	0.00	33979.	1.06	7.30	255	0.00	0.00	0.00	8.
1.03	5.00	106	0.00	0.00	0.00	32748.	1.06	8.00	256	0.00	0.00	0.00	7.
1.03	5.30	107	0.00	0.00	0.00	31557.	1.06	8.30	257	0.00	0.00	0.00	7.
1.03	6.00	108	0.00	0.00	0.00	30403.	1.06	9.00	258	0.00	0.00	0.00	6.
1.03	6.30	109	0.00	0.00	0.00	29287.	1.06	9.30	259	0.00	0.00	0.00	6.
1.03	7.00	110	0.00	0.00	0.00	28207.	1.06	10.00	260	0.00	0.00	0.00	5.
1.03	7.30	111	0.00	0.00	0.00	27162.	1.06	10.30	261	0.00	0.00	0.00	5.
1.03	8.00	112	0.00	0.00	0.00	26151.	1.06	11.00	262	0.00	0.00	0.00	5.
1.03	8.30	113	0.00	0.00	0.00	25174.	1.06	11.30	263	0.00	0.00	0.00	4.
1.03	9.00	114	0.00	0.00	0.00	24230.	1.06	12.00	264	0.00	0.00	0.00	4.

SH 7

1.03	9.30	115	0.00	0.00	0.00	23319.	1.06	12.30	265	0.00	0.00	0.00	4.
1.03	10.00	116	0.00	0.00	0.00	22440.	1.06	13.00	266	0.00	0.00	0.00	4.
1.03	10.30	117	0.00	0.00	0.00	21593.	1.06	13.30	267	0.00	0.00	0.00	3.
1.03	11.00	118	0.00	0.00	0.00	20778.	1.06	14.00	268	0.00	0.00	0.00	3.
1.03	11.30	119	0.00	0.00	0.00	19994.	1.06	14.30	269	0.00	0.00	0.00	3.
1.03	12.00	120	0.00	0.00	0.00	19240.	1.06	15.00	270	0.00	0.00	0.00	3.
1.03	12.30	121	0.00	0.00	0.00	18514.	1.06	15.30	271	0.00	0.00	0.00	3.
1.03	13.00	122	0.00	0.00	0.00	17815.	1.06	16.00	272	0.00	0.00	0.00	2.
1.03	13.30	123	0.00	0.00	0.00	17143.	1.06	16.30	273	0.00	0.00	0.00	2.
1.03	14.00	124	0.00	0.00	0.00	16496.	1.06	17.00	274	0.00	0.00	0.00	2.
1.03	14.30	125	0.00	0.00	0.00	15874.	1.06	17.30	275	0.00	0.00	0.00	2.
1.03	15.00	126	0.00	0.00	0.00	15275.	1.06	18.00	276	0.00	0.00	0.00	2.
1.03	15.30	127	0.00	0.00	0.00	14698.	1.06	18.30	277	0.00	0.00	0.00	2.
1.03	16.00	128	0.00	0.00	0.00	14144.	1.06	19.00	278	0.00	0.00	0.00	2.
1.03	16.30	129	0.00	0.00	0.00	13610.	1.06	19.30	279	0.00	0.00	0.00	1.
1.03	17.00	130	0.00	0.00	0.00	13096.	1.06	20.00	280	0.00	0.00	0.00	1.
1.03	17.30	131	0.00	0.00	0.00	12602.	1.06	20.30	281	0.00	0.00	0.00	1.
1.03	18.00	132	0.00	0.00	0.00	12093.	1.06	21.00	282	0.00	0.00	0.00	1.
1.03	18.30	133	0.00	0.00	0.00	11630.	1.06	21.30	283	0.00	0.00	0.00	1.
1.03	19.00	134	0.00	0.00	0.00	11184.	1.06	22.00	284	0.00	0.00	0.00	1.
1.03	19.30	135	0.00	0.00	0.00	10758.	1.06	22.30	285	0.00	0.00	0.00	1.
1.03	20.00	136	0.00	0.00	0.00	10348.	1.06	23.00	286	0.00	0.00	0.00	1.
1.03	20.30	137	0.00	0.00	0.00	9957.	1.06	23.30	287	0.00	0.00	0.00	1.
1.03	21.00	138	0.00	0.00	0.00	9582.	1.07	0.00	288	0.00	0.00	0.00	1.
1.03	21.30	139	0.00	0.00	0.00	9220.	1.07	.30	289	0.00	0.00	0.00	1.
1.03	22.00	140	0.00	0.00	0.00	8872.	1.07	1.00	290	0.00	0.00	0.00	1.
1.03	22.30	141	0.00	0.00	0.00	8538.	1.07	1.30	291	0.00	0.00	0.00	1.
1.03	23.00	142	0.00	0.00	0.00	8215.	1.07	2.00	292	0.00	0.00	0.00	1.
1.03	23.30	143	0.00	0.00	0.00	7905.	1.07	2.30	293	0.00	0.00	0.00	1.
1.04	0.00	144	0.00	0.00	0.00	7607.	1.07	3.00	294	0.00	0.00	0.00	1.
1.04	.30	145	0.00	0.00	0.00	7320.	1.07	3.30	295	0.00	0.00	0.00	0.
1.04	1.00	146	0.00	0.00	0.00	7044.	1.07	4.00	296	0.00	0.00	0.00	0.
1.04	1.30	147	0.00	0.00	0.00	6778.	1.07	4.30	297	0.00	0.00	0.00	0.
1.04	2.00	148	0.00	0.00	0.00	6522.	1.07	5.00	298	0.00	0.00	0.00	0.
1.04	2.30	149	0.00	0.00	0.00	6276.	1.07	5.30	299	0.00	0.00	0.00	0.
1.04	3.00	150	0.00	0.00	0.00	6039.	1.07	6.00	300	0.00	0.00	0.00	0.
									SUM	26.93	21.39	5.54	1644727.
										(684.)	(543.)	(141.)	(47139.M3)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	41492.	39346.	26824.	11439.	1664687.
CMS	1175.	1114.	760.	324.	47139.
INCHES		5.95	16.23	20.76	20.98
MM		151.17	412.23	527.38	532.97
AC-FT		19511.	53205.	68068.	687B9.
THOUS CU M		24066.	65627.	83960.	84850.

HYDROGRAPH AT STATNFLOW FOR PLAN 1, RTIO 1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2075.	1967.	1341.	572.	83234.
CMS	59.	56.	38.	16.	2357.
INCHES		.30	.81	1.04	1.05
MM		7.56	20.61	26.37	26.65
AC-FT		976.	2660.	3403.	3439.
THOUS CU M		1203.	3281.	4198.	4242.

SH 8

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4149.	3935.	2682.	1144.	166449.
CMS	117.	111.	76.	32.	4714.
INCHES		.60	1.62	2.08	2.10
MM		15.12	41.22	52.76	53.30
AC-FT		1951.	5320.	6807.	6879.
THOUS CU M		2407.	6563.	8396.	8485.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6224.	5902.	4024.	1716.	249703.
CMS	176.	167.	114.	49.	7071.
INCHES		.89	2.43	3.11	3.15
MM		22.67	61.83	79.11	79.95
AC-FT		2927.	7981.	10210.	10318.
THOUS CU M		3610.	9844.	12594.	12727.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 4

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8298.	7869.	5365.	2288.	332937.
CMS	235.	223.	152.	65.	9428.
INCHES		1.19	3.25	4.15	4.20
MM		30.23	82.45	105.48	106.59
AC-FT		3902.	10641.	13614.	13758.
THOUS CU M		4813.	13125.	16792.	16970.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10373.	9837.	6706.	2860.	416172.
CMS	294.	279.	190.	81.	11785.
INCHES		1.49	4.06	5.19	5.25
MM		37.79	103.06	131.85	133.24
AC-FT		4878.	13301.	17017.	17197.
THOUS CU M		6016.	16407.	20990.	21212.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 6

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12448.	11804.	8047.	3432.	499406.
CMS	352.	334.	228.	97.	14142.
INCHES		1.79	4.87	6.23	6.29
MM		45.35	123.67	158.21	159.89
AC-FT		5853.	15961.	20420.	20637.
THOUS CU M		7220.	19688.	25188.	25455.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 7

SH 9

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	20746.	19673.	13412.	5720.	832344.
CMS	587.	557.	380.	162.	23569.
INCHES		2.98	8.11	10.38	10.49
MM		75.58	206.11	263.69	266.48
AC-FT		9755.	26602.	34034.	34394.
THOUS CU M		12033.	32814.	41980.	42425.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 8

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	31119.	29510.	20118.	8579.	1248516.
CMS	881.	836.	570.	243.	35354.
INCHES		4.46	12.17	15.57	15.74
MM		113.37	309.17	395.54	399.73
AC-FT		14633.	39904.	51051.	51592.
THOUS CU M		18049.	49220.	62970.	63637.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 9

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	41492.	39346.	26824.	11439.	1664687.
CMS	1175.	1114.	760.	324.	47139.
INCHES		5.95	16.23	20.76	20.98
MM		151.17	412.23	527.38	532.97
AC-FT		19511.	53205.	68068.	68789.
THOUS CU M		24066.	65627.	83960.	84850.

HYDROGRAPH ROUTING

ROUTING THROUGH MILLSBORO POND

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
OUTFLO	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-5.	-1

STAGE	4.75	5.75	6.50	7.00	8.00	9.00	10.00	11.00	12.00	13.00
	14.00	20.00								
FLOW	0.00	350.00	460.00	570.00	800.00	1000.00	1190.00	1340.00	1470.00	1550.00
	1660.00	2200.00								
SURFACE AREA=	105.	336.	643.							
CAPACITY=	0.	1099.	5911.							
ELEVATION=	5.	10.	20.							

SH 10

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
10.0	3.1	1.5	400.

STATION OUTFLO, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	2.	2.	3.	4.
5.	6.	7.	8.	10.	11.	12.	14.	15.	16.
17.	18.	19.	20.	20.	20.	20.	20.	20.	20.
20.	19.	19.	19.	19.	18.	18.	18.	19.	19.
19.	20.	21.	22.	24.	26.	30.	34.	41.	49.
59.	73.	90.	110.	135.	162.	192.	225.	259.	295.
332.	358.	374.	390.	406.	422.	437.	451.	467.	485.
501.	514.	525.	535.	542.	548.	553.	556.	558.	559.
559.	557.	555.	552.	549.	544.	539.	534.	528.	521.
514.	506.	499.	490.	482.	473.	464.	457.	450.	444.
437.	430.	423.	415.	408.	400.	392.	384.	376.	368.
360.	352.	335.	317.	300.	284.	269.	255.	242.	229.
217.	206.	195.	185.	176.	167.	159.	151.	144.	137.
131.	125.	119.	113.	108.	103.	98.	94.	90.	86.
82.	78.	75.	71.	67.	64.	60.	57.	54.	51.
48.	45.	43.	40.	38.	35.	33.	31.	29.	27.
26.	24.	23.	21.	20.	18.	17.	16.	15.	14.
13.	12.	12.	11.	10.	9.	9.	8.	8.	7.
7.	6.	6.	5.	5.	5.	4.	4.	4.	4.
3.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	2.	2.	3.	3.	3.	4.	4.	5.	5.
5.	5.	6.	6.	6.	6.	6.	6.	6.	6.
6.	6.	6.	6.	6.	6.	6.	6.	6.	6.
6.	6.	6.	7.	7.	8.	9.	10.	12.	15.
18.	22.	28.	35.	43.	52.	62.	74.	86.	100.
114.	129.	144.	160.	177.	194.	210.	226.	241.	255.
267.	278.	287.	295.	301.	306.	310.	312.	314.	315.
314.	313.	312.	309.	306.	303.	298.	294.	289.	283.
278.	272.	265.	259.	252.	246.	239.	232.	225.	217.
210.	202.	194.	186.	178.	170.	162.	154.	146.	139.
131.	123.	115.	108.	102.	96.	90.	85.	80.	75.
71.	67.	63.	60.	57.	54.	51.	48.	46.	43.
41.	39.	37.	35.	34.	32.	31.	29.	28.	27.

SH 11

25.	24.	23.	22.	21.	20.	19.	18.	17.	16.
15.	14.	13.	12.	11.	11.	10.	9.	9.	8.
8.	7.	7.	6.	6.	6.	5.	5.	5.	4.
4.	4.	3.	3.	3.	3.	3.	2.	2.	2.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9
4.9	5.0	5.0	5.1	5.1	5.2	5.3	5.4	5.5	5.6
5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
6.7	6.7	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9
6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8	6.8
6.7	6.7	6.7	6.6	6.6	6.6	6.5	6.5	6.4	6.4
6.3	6.3	6.2	6.2	6.1	6.1	6.0	6.0	5.9	5.9
5.8	5.8	5.7	5.7	5.6	5.6	5.5	5.5	5.4	5.4
5.4	5.3	5.3	5.3	5.3	5.2	5.2	5.2	5.2	5.1
5.1	5.1	5.1	5.1	5.1	5.0	5.0	5.0	5.0	5.0
5.0	5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.9	4.9
4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 559. AT TIME 55.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	559.	553.	481.	229.	33344.
CMS	16.	16.	14.	6.	944.
INCHES		.08	.29	.41	.42
MM		2.12	7.39	10.54	10.68
AC-FT		274.	953.	1360.	1378.
THOUS CU M		338.	1176.	1677.	1700.

STATION OUTFLO, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

SH 12

OUTFLOW

0.	1.	1.	1.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	2.	3.	4.	6.	7.
9.	12.	14.	17.	19.	22.	25.	28.	30.	32.
34.	36.	38.	39.	40.	40.	40.	40.	40.	40.
39.	39.	38.	38.	37.	37.	37.	37.	37.	38.
39.	40.	42.	44.	48.	53.	59.	68.	80.	96.
117.	143.	176.	215.	260.	310.	357.	382.	410.	440.
477.	524.	570.	617.	663.	706.	746.	784.	816.	844.
868.	890.	909.	925.	939.	951.	961.	969.	976.	981.
985.	987.	988.	988.	987.	985.	982.	978.	973.	968.
961.	954.	947.	939.	930.	920.	910.	900.	889.	878.
866.	854.	841.	828.	815.	801.	785.	769.	753.	736.
720.	703.	686.	670.	653.	636.	619.	602.	586.	569.
553.	537.	522.	506.	491.	475.	460.	450.	440.	430.
420.	410.	400.	389.	379.	369.	359.	347.	326.	302.
282.	263.	246.	229.	213.	198.	185.	171.	159.	148.
137.	127.	118.	109.	101.	94.	87.	81.	75.	69.
64.	59.	55.	51.	47.	44.	41.	38.	35.	32.
30.	28.	26.	24.	22.	21.	19.	18.	17.	15.
14.	13.	12.	12.	11.	10.	9.	9.	8.	7.
7.	6.	6.	6.	5.	5.	5.	4.	4.	4.
3.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

0.	0.	0.	0.	0.	0.	1.	1.	1.	1.
1.	1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	2.	2.
3.	4.	4.	5.	6.	7.	8.	8.	9.	10.
10.	11.	11.	12.	12.	12.	12.	12.	12.	12.
12.	12.	12.	11.	11.	11.	11.	11.	11.	11.
12.	12.	13.	14.	15.	16.	18.	21.	25.	30.
37.	45.	57.	70.	87.	106.	127.	152.	181.	213.
248.	286.	324.	364.	403.	443.	481.	518.	553.	585.
615.	643.	667.	688.	707.	723.	737.	748.	757.	764.
769.	772.	774.	774.	772.	770.	765.	760.	753.	746.
737.	728.	717.	706.	695.	682.	669.	656.	642.	628.
613.	598.	582.	567.	551.	535.	519.	503.	487.	471.
456.	440.	425.	409.	394.	380.	365.	351.	337.	323.
310.	297.	284.	271.	259.	247.	236.	224.	213.	202.
191.	181.	170.	160.	149.	139.	130.	120.	111.	103.
95.	88.	81.	75.	70.	64.	60.	55.	51.	47.
43.	40.	37.	34.	32.	29.	27.	25.	23.	21.
20.	18.	17.	16.	14.	13.	12.	11.	11.	10.
9.	8.	8.	7.	7.	6.	6.	5.	5.	5.
4.	4.	4.	3.	3.	3.	3.	3.	2.	2.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SH 13

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	5.0	5.0
5.1	5.2	5.3	5.4	5.5	5.6	5.8	6.0	6.2	6.4
6.6	6.8	7.0	7.2	7.4	7.6	7.8	7.9	8.1	8.2
8.3	8.4	8.5	8.6	8.7	8.8	8.8	8.8	8.9	8.9
8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8
8.8	8.8	8.7	8.7	8.6	8.6	8.6	8.5	8.4	8.4
8.3	8.3	8.2	8.1	8.1	8.0	7.9	7.9	7.8	7.7
7.7	7.6	7.5	7.4	7.4	7.3	7.2	7.1	7.1	7.0
6.9	6.9	6.8	6.7	6.6	6.6	6.5	6.4	6.4	6.3
6.2	6.2	6.1	6.0	5.9	5.9	5.8	5.7	5.7	5.6
5.6	5.5	5.5	5.4	5.4	5.3	5.3	5.2	5.2	5.2
5.1	5.1	5.1	5.1	5.0	5.0	5.0	5.0	5.0	4.9
4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 988. AT TIME 56.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	988.	982.	885.	456.	66629.
CMS	28.	28.	25.	13.	1887.
INCHES		.15	.54	.83	.84
MM		3.77	13.59	21.04	21.33
AC-FT		487.	1755.	2715.	2753.
THOUS CU M		600.	2164.	3349.	3396.

STATION OUTFLO, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	1.	2.	2.	2.	2.	3.	3.	3.	3.
3.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	2.	2.	3.	5.	6.	9.	11.
14.	18.	21.	25.	29.	33.	37.	41.	45.	48.
51.	54.	56.	58.	59.	60.	60.	60.	60.	60.
59.	58.	57.	57.	56.	55.	55.	55.	56.	57.
58.	60.	63.	66.	72.	79.	89.	102.	119.	142.
172.	210.	257.	313.	361.	392.	427.	467.	527.	589.

SH 14

653.	717.	781.	836.	888.	937.	983.	1025.	1063.	1098.
1130.	1158.	1183.	1230.	1310.	1389.	1459.	1514.	1553.	1578.
1590.	1592.	1584.	1569.	1548.	1523.	1495.	1464.	1433.	1400.
1367.	1335.	1304.	1274.	1246.	1221.	1200.	1188.	1180.	1171.
1162.	1152.	1141.	1130.	1119.	1107.	1094.	1081.	1068.	1054.
1040.	1026.	1011.	996.	980.	964.	947.	931.	914.	897.
879.	862.	844.	826.	808.	789.	768.	748.	727.	706.
686.	666.	646.	625.	606.	586.	567.	548.	530.	512.
494.	477.	459.	448.	436.	424.	412.	400.	388.	375.
363.	351.	324.	298.	273.	251.	229.	210.	192.	175.
160.	147.	134.	122.	112.	102.	93.	85.	78.	71.
65.	59.	54.	50.	45.	42.	38.	35.	32.	29.
27.	25.	23.	21.	19.	18.	16.	15.	14.	13.
12.	11.	10.	9.	9.	8.	7.	7.	6.	6.
6.	5.	5.	4.	4.	4.	4.	3.	3.	3.
3.	2.	2.	2.	2.	2.	2.	2.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	1.	1.	2.	3.	3.
4.	5.	6.	8.	9.	10.	11.	13.	14.	15.
16.	17.	17.	18.	18.	18.	19.	19.	18.	18.
18.	18.	18.	17.	17.	17.	17.	17.	17.	17.
18.	18.	19.	20.	22.	24.	27.	32.	37.	45.
55.	69.	86.	106.	132.	162.	199.	241.	288.	339.
395.	453.	514.	577.	640.	704.	767.	828.	887.	943.
995.	1043.	1087.	1126.	1159.	1186.	1207.	1222.	1233.	1239.
1242.	1243.	1241.	1237.	1231.	1225.	1217.	1208.	1199.	1189.
1179.	1168.	1157.	1146.	1134.	1121.	1109.	1095.	1081.	1066.
1049.	1032.	1014.	996.	977.	957.	936.	916.	895.	873.
852.	830.	807.	785.	763.	741.	718.	696.	674.	651.
629.	608.	586.	565.	543.	523.	502.	482.	462.	443.
424.	406.	388.	371.	354.	337.	321.	306.	291.	276.
262.	248.	235.	222.	209.	196.	183.	170.	158.	146.
134.	122.	111.	101.	92.	83.	76.	69.	62.	56.
51.	47.	42.	38.	35.	32.	29.	26.	24.	22.
20.	18.	17.	15.	14.	13.	12.	11.	10.	9.
8.	8.	7.	6.	6.	5.	5.	5.	4.	4.
4.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9	4.9	4.9
4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9

SH 15

4.9	4.9	4.9	4.9	5.0	5.0	5.0	5.0	5.1	5.2
5.2	5.4	5.5	5.6	5.8	6.0	6.3	6.5	6.8	7.1
7.4	7.6	7.9	8.2	8.4	8.7	8.9	9.1	9.3	9.5
9.7	9.8	10.0	10.1	10.2	10.3	10.3	10.4	10.4	10.4
10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.3	10.3	10.3
10.2	10.2	10.2	10.1	10.1	10.1	10.0	10.0	9.9	9.9
9.9	9.8	9.7	9.7	9.6	9.6	9.5	9.4	9.4	9.3
9.2	9.1	9.1	9.0	8.9	8.8	8.7	8.7	8.6	8.5
8.4	8.3	8.2	8.1	8.0	8.0	7.9	7.8	7.7	7.6
7.5	7.4	7.3	7.2	7.2	7.1	7.0	6.9	6.8	6.7
6.7	6.6	6.5	6.4	6.3	6.3	6.2	6.1	6.0	5.9
5.8	5.8	5.7	5.6	5.5	5.5	5.4	5.3	5.3	5.3
5.2	5.2	5.1	5.1	5.1	5.0	5.0	5.0	5.0	5.0
4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 1592. AT TIME 56.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1592.	1538.	1261.	683.	99925.
CMS	45.	44.	36.	19.	2830.
INCHES		.23	.76	1.24	1.26
MM		5.91	19.38	31.49	31.99
AC-FT		763.	2502.	4065.	4129.
THOUS CU M		941.	3086.	5014.	5093.

STATION OUTFLO, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	2.	2.	3.	3.	3.	3.	4.	4.	4.
4.	4.	4.	3.	3.	3.	3.	3.	3.	3.
3.	3.	2.	2.	2.	2.	2.	2.	2.	2.
2.	1.	2.	2.	3.	4.	6.	8.	11.	15.
19.	23.	28.	33.	39.	44.	49.	55.	60.	64.
68.	72.	75.	77.	79.	80.	80.	80.	80.	80.
79.	78.	77.	75.	74.	74.	73.	73.	74.	75.
77.	80.	84.	88.	95.	104.	117.	135.	158.	188.
226.	275.	335.	374.	409.	450.	511.	581.	657.	734.
809.	876.	942.	1005.	1064.	1119.	1172.	1294.	1545.	1811.
2049.	2240.	2383.	2481.	2539.	2566.	2567.	2549.	2516.	2472.
2421.	2364.	2303.	2240.	2176.	2111.	2047.	1984.	1921.	1861.
1802.	1744.	1689.	1636.	1584.	1535.	1488.	1443.	1400.	1360.
1322.	1287.	1255.	1226.	1203.	1188.	1180.	1170.	1161.	1150.
1139.	1128.	1116.	1104.	1091.	1078.	1064.	1051.	1036.	1022.
1007.	991.	975.	959.	942.	925.	908.	891.	873.	856.
838.	820.	802.	781.	760.	739.	719.	698.	677.	657.
637.	616.	596.	576.	556.	537.	517.	498.	479.	460.
447.	434.	422.	409.	396.	383.	371.	358.	339.	311.
284.	260.	237.	216.	197.	179.	163.	149.	135.	123.

SH 16

112.	102.	92.	84.	77.	70.	63.	58.	53.	48.
44.	40.	36.	33.	30.	28.	25.	23.	21.	20.
18.	17.	15.	14.	13.	12.	11.	10.	9.	9.
8.	7.	7.	6.	6.	5.	5.	5.	4.	4.
4.	3.	3.	3.	3.	3.	2.	2.	2.	2.
2.	2.	2.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

0.	0.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	0.	1.	1.	1.	2.	3.	3.	4.
6.	7.	9.	10.	12.	13.	15.	17.	18.	20.
21.	22.	23.	24.	24.	25.	25.	25.	25.	25.
24.	24.	24.	23.	23.	23.	23.	23.	23.	23.
24.	25.	26.	27.	30.	33.	37.	43.	50.	61.
74.	92.	115.	144.	180.	224.	275.	333.	398.	469.
545.	626.	711.	798.	884.	978.	1067.	1153.	1231.	1295.
1346.	1385.	1412.	1430.	1441.	1446.	1446.	1443.	1437.	1429.
1419.	1408.	1397.	1385.	1372.	1359.	1346.	1333.	1320.	1306.
1293.	1280.	1267.	1254.	1241.	1228.	1215.	1202.	1189.	1177.
1164.	1151.	1138.	1124.	1110.	1096.	1081.	1065.	1048.	1030.
1011.	992.	972.	952.	932.	910.	889.	867.	845.	823.
801.	778.	756.	733.	711.	689.	666.	644.	622.	600.
578.	557.	536.	515.	494.	474.	455.	435.	416.	398.
380.	363.	346.	329.	312.	296.	280.	265.	250.	235.
221.	207.	193.	180.	167.	154.	141.	129.	117.	106.
96.	87.	78.	71.	64.	58.	52.	47.	43.	39.
35.	32.	29.	26.	24.	21.	19.	18.	16.	15.
13.	12.	11.	10.	9.	8.	8.	7.	6.	6.
5.	5.	5.	4.	4.	4.	3.	3.	3.	3.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9
4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.1	5.2	5.3
5.4	5.5	5.7	5.9	6.2	6.4	6.7	7.0	7.4	7.7
8.0	8.4	8.7	9.0	9.3	9.6	9.9	10.2	10.4	10.6
10.7	10.8	10.9	10.9	11.0	11.0	11.0	11.0	11.0	10.9
10.9	10.9	10.9	10.8	10.8	10.8	10.7	10.7	10.6	10.6
10.4	10.5	10.5	10.5	10.4	10.4	10.3	10.3	10.3	10.2
10.2	10.2	10.1	10.1	10.0	10.0	9.9	9.9	9.8	9.8
9.7	9.7	9.6	9.5	9.5	9.4	9.3	9.3	9.2	9.1
9.0	9.0	8.9	8.8	8.7	8.6	8.5	8.5	8.4	8.3
8.2	8.1	8.0	7.9	7.8	7.7	7.6	7.6	7.5	7.4
7.3	7.2	7.1	7.0	6.9	6.8	6.8	6.7	6.6	6.5

SA 17

6.4	6.3	6.2	6.2	6.1	6.0	5.9	5.8	5.7	5.6
5.6	5.5	5.4	5.4	5.3	5.3	5.2	5.2	5.1	5.1
5.1	5.0	5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.9
4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 2567. AT TIME 53.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2567.	2450.	1749.	910.	133234.
CMS	73.	69.	50.	26.	3773.
INCHES		.37	1.06	1.65	1.68
MM		9.41	26.87	41.94	42.66
AC-FT		1215.	3468.	5413.	5506.
THOUS CU M		1499.	4278.	6677.	6791.

STATION OUTFLO, PLAN 1, RATIO 5

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	2.	3.	3.	4.	4.	4.	4.	5.	5.
5.	5.	4.	4.	4.	4.	4.	4.	4.	3.
3.	3.	3.	3.	3.	3.	2.	2.	2.	2.
2.	2.	2.	3.	4.	5.	8.	11.	14.	19.
24.	29.	35.	42.	48.	55.	62.	68.	74.	80.
85.	90.	93.	96.	98.	99.	100.	100.	100.	99.
98.	97.	96.	94.	93.	92.	92.	92.	93.	94.
97.	100.	104.	110.	119.	130.	146.	167.	196.	232.
279.	338.	376.	413.	456.	527.	605.	690.	776.	856.
933.	1009.	1080.	1149.	1267.	1627.	2049.	2452.	2795.	3066.
3263.	3393.	3467.	3495.	3487.	3453.	3399.	3331.	3253.	3169.
3081.	2990.	2899.	2808.	2718.	2629.	2542.	2456.	2373.	2293.
2215.	2140.	2067.	1998.	1931.	1866.	1804.	1744.	1687.	1633.
1580.	1530.	1482.	1437.	1394.	1353.	1315.	1280.	1248.	1221.
1198.	1186.	1178.	1168.	1158.	1148.	1137.	1126.	1114.	1101.
1088.	1075.	1062.	1048.	1033.	1019.	1004.	988.	972.	955.
939.	922.	904.	887.	869.	852.	834.	815.	797.	776.
755.	734.	713.	691.	670.	648.	626.	605.	583.	562.
541.	521.	501.	481.	461.	447.	434.	421.	408.	395.
382.	369.	356.	333.	305.	278.	254.	231.	210.	191.
173.	157.	143.	130.	118.	107.	97.	88.	80.	72.
66.	60.	54.	49.	45.	41.	37.	34.	31.	28.
26.	23.	21.	20.	18.	16.	15.	14.	13.	12.
11.	10.	9.	8.	8.	7.	7.	6.	6.	5.
5.	4.	4.	4.	4.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SH 18

STORAGE

0.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	2.	2.	3.	4.	6.
7.	9.	11.	13.	15.	17.	19.	21.	23.	25.
26.	28.	29.	30.	31.	31.	31.	31.	31.	31.
31.	30.	30.	29.	29.	29.	28.	29.	29.	29.
30.	31.	33.	35.	37.	41.	46.	54.	63.	76.
94.	116.	146.	184.	231.	288.	353.	428.	510.	601.
699.	803.	913.	1027.	1143.	1252.	1346.	1425.	1487.	1533.
1566.	1587.	1599.	1603.	1602.	1596.	1588.	1577.	1564.	1550.
1535.	1520.	1505.	1489.	1473.	1457.	1441.	1426.	1410.	1395.
1380.	1365.	1350.	1336.	1322.	1307.	1294.	1280.	1266.	1253.
1240.	1227.	1214.	1200.	1187.	1174.	1161.	1148.	1135.	1121.
1107.	1093.	1077.	1061.	1044.	1026.	1007.	988.	968.	948.
927.	906.	885.	863.	841.	819.	796.	774.	751.	729.
706.	684.	662.	639.	617.	595.	573.	552.	531.	510.
489.	469.	449.	429.	410.	390.	371.	353.	335.	317.
300.	283.	267.	251.	236.	221.	207.	193.	179.	165.
152.	139.	127.	115.	104.	93.	84.	76.	69.	62.
56.	50.	45.	41.	37.	33.	30.	27.	25.	22.
20.	18.	17.	15.	14.	12.	11.	10.	9.	8.
8.	7.	6.	6.	5.	5.	5.	4.	4.	4.
3.	3.	3.	3.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	5.0	5.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5.0	5.0	5.0	5.1	5.1	5.1	5.2	5.2	5.3	5.4
5.5	5.7	5.9	6.2	6.5	6.8	7.2	7.5	7.9	8.3
8.7	9.0	9.4	9.8	10.1	10.4	10.7	10.9	11.1	11.2
11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3
11.2	11.2	11.2	11.1	11.1	11.0	11.0	10.9	10.9	10.9
10.8	10.8	10.7	10.7	10.6	10.6	10.6	10.5	10.5	10.5
10.4	10.4	10.3	10.3	10.3	10.2	10.2	10.1	10.1	10.1
10.0	10.0	9.9	9.9	9.8	9.8	9.7	9.7	9.6	9.5
9.5	9.4	9.3	9.3	9.2	9.1	9.0	8.9	8.9	8.8
8.7	8.6	8.5	8.4	8.3	8.3	8.2	8.1	8.0	7.9
7.8	7.7	7.6	7.5	7.4	7.3	7.2	7.2	7.1	7.0
6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	6.1
6.0	5.9	5.8	5.7	5.6	5.5	5.5	5.4	5.3	5.3
5.2	5.2	5.2	5.1	5.1	5.1	5.0	5.0	5.0	5.0
4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

SH 19

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 3495. AT TIME 52.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3495.	3318.	2272.	1136.	166542.
CMS	99.	94.	64.	32.	4716.
INCHES		.50	1.37	2.06	2.10
MM		12.75	34.91	52.38	53.32
AC-FT		1645.	4506.	6760.	6882.
THOUS CU M		2030.	5558.	8339.	8489.

STATION OUTFLO, PLAN 1, RATIO 6

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

3.	5.	7.	8.	9.	10.	11.	11.	11.	11.
11.	11.	11.	11.	11.	10.	10.	9.	9.	9.
8.	8.	8.	7.	7.	6.	6.	6.	5.	5.
5.	5.	5.	6.	9.	13.	19.	26.	35.	46.
58.	72.	87.	102.	118.	134.	150.	166.	181.	194.
207.	218.	227.	234.	239.	243.	245.	246.	246.	244.
242.	240.	237.	234.	232.	230.	229.	229.	231.	235.
240.	248.	258.	271.	290.	316.	351.	371.	398.	434.
488.	569.	669.	781.	890.	1004.	1117.	1357.	2234.	3344.
4493.	5576.	6551.	7404.	8128.	8724.	9189.	9530.	9754.	9865.
9872.	9793.	9647.	9451.	9219.	8965.	8699.	8426.	8152.	7880.
7613.	7351.	7094.	6844.	6601.	6364.	6136.	5915.	5701.	5495.
5296.	5104.	4919.	4738.	4565.	4399.	4239.	4085.	3938.	3796.
3659.	3527.	3398.	3275.	3157.	3043.	2934.	2829.	2728.	2632.
2539.	2449.	2363.	2280.	2201.	2125.	2052.	1982.	1914.	1850.
1788.	1729.	1672.	1618.	1566.	1517.	1470.	1425.	1383.	1344.
1306.	1272.	1241.	1214.	1194.	1184.	1175.	1165.	1155.	1144.
1132.	1120.	1107.	1094.	1079.	1064.	1048.	1031.	1014.	996.
977.	957.	937.	917.	896.	875.	853.	832.	810.	786.
761.	736.	711.	685.	661.	636.	611.	587.	563.	540.
518.	496.	474.	455.	441.	427.	413.	399.	385.	371.
357.	335.	305.	277.	251.	227.	205.	185.	167.	151.
136.	123.	111.	100.	90.	81.	73.	66.	59.	53.
48.	43.	39.	35.	32.	29.	26.	24.	22.	20.
18.	16.	15.	13.	12.	11.	10.	9.	9.	8.
7.	7.	6.	6.	5.	5.	4.	4.	4.	3.
3.	3.	3.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

1.	2.	2.	2.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	2.	2.	3.	4.	6.	8.	11.	14.
18.	22.	27.	32.	37.	42.	48.	53.	58.	63.
67.	71.	75.	77.	79.	80.	81.	81.	81.	81.
80.	79.	78.	77.	76.	76.	75.	75.	76.	77.
79.	82.	86.	91.	98.	108.	122.	141.	169.	206.
257.	323.	409.	515.	643.	796.	975.	1176.	1383.	1579.
1755.	1909.	2041.	2152.	2244.	2318.	2375.	2417.	2444.	2457.

SH 20

2458.	2448.	2431.	2407.	2379.	2348.	2315.	2282.	2247.	2213.
2179.	2145.	2112.	2080.	2047.	2016.	1985.	1955.	1926.	1897.
1869.	1842.	1816.	1790.	1765.	1741.	1717.	1694.	1672.	1650.
1629.	1608.	1588.	1568.	1548.	1529.	1511.	1492.	1475.	1458.
1441.	1424.	1408.	1392.	1377.	1362.	1347.	1332.	1318.	1304.
1290.	1276.	1263.	1249.	1236.	1223.	1210.	1197.	1184.	1171.
1158.	1145.	1131.	1118.	1103.	1088.	1072.	1055.	1038.	1019.
999.	979.	958.	936.	912.	888.	863.	837.	811.	785.
758.	731.	704.	677.	651.	624.	598.	571.	545.	520.
495.	471.	447.	424.	401.	380.	358.	338.	318.	299.
281.	263.	246.	230.	214.	199.	184.	169.	155.	141.
128.	115.	103.	93.	83.	75.	67.	60.	54.	48.
43.	39.	35.	31.	28.	25.	22.	20.	18.	16.
15.	13.	12.	11.	10.	9.	8.	7.	7.	6.
5.	5.	4.	4.	4.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9
4.9	5.0	5.0	5.0	5.1	5.1	5.2	5.2	5.3	5.3
5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.5	5.5	5.4
5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
5.4	5.5	5.5	5.5	5.6	5.7	5.8	5.9	6.1	6.3
6.6	7.0	7.4	7.9	8.5	9.0	9.6	10.2	10.8	11.4
11.8	12.2	12.5	12.8	13.0	13.2	13.3	13.4	13.5	13.5
13.5	13.5	13.5	13.4	13.4	13.3	13.2	13.1	13.0	13.0
12.9	12.8	12.7	12.6	12.6	12.5	12.4	12.3	12.3	12.2
12.1	12.0	12.0	11.9	11.8	11.8	11.7	11.7	11.6	11.5
11.5	11.4	11.4	11.3	11.3	11.2	11.2	11.1	11.1	11.0
11.0	10.9	10.9	10.8	10.8	10.8	10.7	10.7	10.6	10.6
10.6	10.5	10.5	10.4	10.4	10.4	10.3	10.3	10.3	10.2
10.2	10.1	10.1	10.1	10.0	10.0	9.9	9.9	9.8	9.8
9.7	9.6	9.6	9.5	9.4	9.3	9.3	9.2	9.1	9.0
8.9	8.8	8.7	8.6	8.5	8.4	8.3	8.2	8.1	7.9
7.8	7.7	7.6	7.5	7.4	7.3	7.2	7.1	7.0	6.9
6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	6.0	5.9
5.8	5.7	5.6	5.5	5.5	5.4	5.3	5.3	5.2	5.2
5.1	5.1	5.1	5.0	5.0	5.0	5.0	4.9	4.9	4.9
4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 9872. AT TIME 50.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9872.	9380.	6366.	2829.	416285.
CMS	280.	266.	180.	80.	11788.
INCHES		1.42	3.85	5.13	5.25
MM		36.04	97.84	130.40	133.28
AC-FT		4651.	12628.	16831.	17202.

SH 21

THOUS CU M 5737. 15576. 20761. 21218.

STATION OUTFLO, PLAN 1, RATIO 7

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

5.	10.	14.	17.	19.	20.	21.	22.	23.	23.
23.	22.	22.	22.	21.	20.	20.	19.	18.	17.
17.	16.	15.	14.	14.	13.	12.	11.	11.	10.
10.	9.	10.	13.	18.	26.	38.	52.	70.	92.
116.	142.	170.	200.	230.	261.	291.	320.	348.	360.
371.	381.	390.	397.	404.	410.	414.	417.	420.	422.
423.	424.	424.	424.	424.	424.	424.	426.	428.	432.
437.	444.	453.	466.	489.	520.	560.	613.	681.	765.
859.	967.	1086.	1276.	2313.	3835.	5559.	7338.	9126.	10865.
12511.	14038.	15425.	16650.	17698.	18557.	19225.	19701.	19984.	20073.
19979.	19734.	19371.	18921.	18412.	17867.	17305.	16737.	16171.	15612.
15064.	14528.	14007.	13500.	13009.	12533.	12073.	11629.	11199.	10786.
10385.	10001.	9632.	9276.	8934.	8604.	8287.	7982.	7691.	7410.
7139.	6876.	6620.	6374.	6138.	5911.	5693.	5484.	5283.	5091.
4904.	4723.	4550.	4384.	4224.	4071.	3923.	3782.	3646.	3515.
3389.	3268.	3151.	3039.	2931.	2827.	2728.	2632.	2539.	2449.
2363.	2280.	2199.	2121.	2046.	1973.	1904.	1837.	1773.	1711.
1653.	1596.	1540.	1481.	1422.	1365.	1312.	1264.	1223.	1193.
1180.	1168.	1154.	1139.	1124.	1108.	1092.	1075.	1057.	1039.
1020.	1001.	981.	960.	939.	917.	895.	873.	851.	828.
806.	780.	754.	728.	702.	677.	651.	626.	601.	576.
552.	529.	507.	484.	462.	447.	433.	418.	404.	390.
376.	362.	346.	315.	286.	259.	234.	211.	191.	172.
155.	140.	126.	113.	102.	91.	82.	74.	67.	60.
54.	48.	44.	39.	35.	32.	29.	26.	24.	21.
19.	18.	16.	14.	13.	12.	11.	10.	9.	8.
8.	7.	6.	6.	5.	5.	4.	4.	4.	3.
3.	3.	3.	3.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	0.	0.	0.	0.	0.

STORAGE

2.	3.	4.	5.	6.	6.	6.	7.	7.	7.
7.	7.	7.	7.	6.	6.	6.	6.	5.	5.
5.	5.	5.	4.	4.	4.	4.	3.	3.	3.
3.	3.	3.	4.	5.	8.	11.	16.	22.	28.
36.	45.	55.	65.	76.	87.	98.	109.	120.	131.
141.	151.	160.	168.	175.	180.	185.	189.	192.	193.
195.	195.	195.	195.	195.	195.	196.	198.	200.	204.
210.	217.	227.	240.	258.	282.	315.	360.	420.	499.
605.	744.	923.	1146.	1399.	1656.	1906.	2144.	2368.	2576.
2768.	2944.	3101.	3238.	3354.	3449.	3523.	3575.	3606.	3615.
3605.	3578.	3539.	3489.	3433.	3373.	3311.	3247.	3184.	3122.
3060.	2999.	2940.	2882.	2826.	2771.	2718.	2666.	2615.	2566.
2519.	2473.	2429.	2386.	2344.	2304.	2264.	2226.	2189.	2153.
2118.	2084.	2050.	2017.	1986.	1955.	1925.	1896.	1868.	1840.
1814.	1788.	1763.	1739.	1715.	1692.	1670.	1648.	1627.	1606.
1586.	1566.	1547.	1528.	1510.	1492.	1475.	1458.	1441.	1424.
1408.	1392.	1377.	1361.	1346.	1331.	1316.	1301.	1287.	1272.
1258.	1244.	1229.	1213.	1196.	1178.	1160.	1142.	1123.	1103.
1082.	1060.	1036.	1012.	986.	960.	933.	906.	878.	849.
821.	792.	764.	735.	706.	678.	650.	622.	594.	567.
540.	514.	489.	464.	439.	416.	393.	371.	350.	329.

SH 22

309.	290.	272.	254.	237.	221.	205.	190.	175.	160.
146.	133.	119.	107.	96.	86.	77.	69.	62.	55.
49.	44.	40.	35.	32.	28.	25.	23.	20.	18.
16.	15.	13.	12.	11.	10.	9.	8.	7.	6.
6.	5.	5.	4.	4.	4.	3.	3.	3.	2.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9	5.0	5.0
5.1	5.2	5.2	5.3	5.4	5.5	5.6	5.7	5.7	5.8
5.9	6.0	6.0	6.1	6.1	6.2	6.2	6.2	6.2	6.2
6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
6.3	6.4	6.5	6.5	6.6	6.8	7.0	7.2	7.5	7.8
8.3	8.8	9.5	10.1	10.9	11.6	12.2	12.8	13.3	13.8
14.2	14.6	15.0	15.2	15.5	15.7	15.8	15.9	16.0	16.0
16.0	15.9	15.8	15.8	15.6	15.5	15.4	15.3	15.1	15.0
14.9	14.7	14.6	14.5	14.4	14.2	14.1	14.0	13.9	13.8
13.7	13.6	13.5	13.4	13.3	13.2	13.1	13.0	12.9	12.8
12.7	12.7	12.6	12.5	12.4	12.3	12.3	12.2	12.1	12.0
12.0	11.9	11.8	11.8	11.7	11.7	11.6	11.5	11.5	11.4
11.4	11.3	11.3	11.2	11.2	11.1	11.1	11.0	11.0	10.9
10.9	10.8	10.8	10.8	10.7	10.7	10.6	10.6	10.5	10.5
10.5	10.4	10.4	10.3	10.3	10.2	10.2	10.1	10.1	10.0
9.9	9.9	9.8	9.7	9.7	9.6	9.5	9.4	9.3	9.2
9.1	9.0	8.9	8.8	8.7	8.6	8.5	8.4	8.3	8.1
8.0	7.9	7.8	7.7	7.6	7.5	7.4	7.2	7.1	7.0
6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	6.0
5.9	5.8	5.7	5.6	5.6	5.5	5.4	5.4	5.3	5.2
5.2	5.1	5.1	5.1	5.0	5.0	5.0	5.0	4.9	4.9
4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 20073. AT TIME 50.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	20073.	19111.	13139.	5653.	832519.
CMS	568.	541.	372.	160.	23574.
INCHES		2.89	7.95	10.26	10.49
MM		73.42	201.92	260.64	266.54
AC-FT		9476.	26061.	33640.	34402.
THOUS CU M		11689.	32146.	41495.	42434.

STATION OUTFLO, PLAN 1, RATIO 8

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

8.	15.	20.	25.	28.	30.	32.	33.	34.	34.
34.	34.	33.	32.	31.	31.	29.	28.	27.	26.

SH23

25.	24.	23.	21.	20.	19.	18.	17.	16.	15.
14.	14.	15.	19.	27.	39.	56.	78.	105.	136.
171.	209.	249.	292.	335.	362.	381.	400.	419.	438.
456.	478.	500.	519.	535.	549.	561.	570.	578.	584.
588.	592.	594.	596.	598.	600.	603.	607.	613.	622.
633.	647.	664.	686.	716.	755.	805.	863.	935.	1023.
1126.	1441.	2595.	4240.	6184.	8323.	10595.	12912.	15232.	17519.
19729.	21814.	23729.	25434.	26900.	28106.	29042.	29704.	30086.	30186.
30019.	29628.	29065.	28374.	27596.	26766.	25912.	25050.	24193.	23348.
22520.	21712.	20926.	20162.	19422.	18706.	18014.	17346.	16701.	16080.
15482.	14906.	14352.	13819.	13306.	12812.	12336.	11879.	11438.	11012.
10603.	10208.	9821.	9452.	9097.	8756.	8429.	8116.	7817.	7530.
7254.	6988.	6732.	6486.	6249.	6021.	5801.	5590.	5386.	5190.
5002.	4818.	4641.	4472.	4309.	4152.	4002.	3857.	3718.	3585.
3455.	3330.	3208.	3090.	2977.	2867.	2761.	2659.	2561.	2466.
2374.	2286.	2196.	2099.	2000.	1901.	1807.	1717.	1632.	1552.
1477.	1408.	1345.	1290.	1241.	1204.	1185.	1172.	1158.	1143.
1128.	1112.	1095.	1078.	1060.	1042.	1023.	1004.	983.	962.
941.	919.	897.	875.	853.	830.	807.	782.	756.	730.
704.	678.	653.	627.	602.	577.	554.	530.	508.	485.
463.	448.	433.	419.	405.	390.	376.	362.	347.	315.
286.	259.	234.	212.	191.	172.	155.	139.	126.	113.
102.	91.	82.	74.	66.	60.	54.	48.	44.	39.
35.	32.	29.	26.	24.	21.	19.	17.	16.	14.
13.	12.	11.	10.	9.	8.	8.	7.	6.	6.
5.	5.	4.	4.	4.	3.	3.	3.	3.	3.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

STORAGE

2.	5.	6.	7.	8.	9.	10.	10.	10.	10.
10.	10.	10.	10.	10.	9.	9.	9.	8.	8.
8.	7.	7.	6.	6.	6.	5.	5.	5.	5.
4.	4.	5.	6.	8.	12.	17.	24.	33.	43.
55.	68.	83.	99.	115.	133.	151.	171.	191.	211.
231.	249.	266.	282.	295.	307.	316.	324.	331.	336.
339.	342.	344.	345.	347.	349.	351.	355.	360.	367.
377.	389.	405.	425.	452.	489.	540.	609.	701.	825.
989.	1202.	1451.	1717.	1992.	2269.	2544.	2815.	3079.	3334.
3578.	3805.	4013.	4197.	4355.	4484.	4585.	4656.	4697.	4707.
4689.	4647.	4587.	4513.	4429.	4340.	4248.	4155.	4063.	3972.
3882.	3794.	3709.	3625.	3544.	3465.	3389.	3315.	3243.	3174.
3107.	3042.	2979.	2919.	2860.	2803.	2748.	2695.	2643.	2593.
2545.	2498.	2452.	2407.	2364.	2322.	2282.	2243.	2205.	2169.
2133.	2098.	2065.	2032.	2000.	1970.	1940.	1910.	1882.	1854.
1828.	1801.	1776.	1751.	1728.	1704.	1682.	1660.	1638.	1617.
1597.	1577.	1557.	1537.	1518.	1499.	1481.	1462.	1445.	1427.
1410.	1393.	1376.	1357.	1336.	1315.	1294.	1273.	1253.	1232.
1212.	1192.	1172.	1152.	1131.	1111.	1049.	1067.	1043.	1018.
992.	965.	938.	910.	882.	854.	825.	796.	767.	738.
709.	681.	652.	624.	597.	569.	542.	516.	490.	465.
441.	417.	394.	372.	351.	330.	310.	291.	273.	255.
238.	222.	206.	190.	175.	161.	147.	133.	120.	108.
96.	86.	77.	69.	62.	55.	49.	44.	40.	35.
32.	28.	25.	23.	20.	18.	16.	15.	13.	12.
11.	10.	9.	8.	7.	6.	6.	5.	5.	4.
4.	4.	3.	3.	3.	2.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

SH 24

4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.9	4.9	5.0	5.0	5.1
5.2	5.3	5.5	5.6	5.7	5.8	6.0	6.1	6.2	6.3
6.5	6.6	6.7	6.8	6.8	6.9	7.0	7.0	7.0	7.1
7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.2
7.3	7.3	7.4	7.5	7.6	7.8	8.0	8.3	8.7	9.1
9.7	10.3	11.0	11.7	12.4	13.1	13.7	14.3	14.9	15.4
15.9	16.4	16.8	17.1	17.4	17.6	17.8	17.9	18.0	18.0
18.0	17.9	17.8	17.7	17.5	17.4	17.2	17.0	16.9	16.7
16.5	16.3	16.2	16.0	15.9	15.7	15.6	15.4	15.3	15.1
15.0	14.8	14.7	14.6	14.4	14.3	14.2	14.1	14.0	13.9
13.7	13.6	13.5	13.4	13.3	13.2	13.1	13.0	12.9	12.9
12.8	12.7	12.6	12.5	12.4	12.4	12.3	12.2	12.1	12.1
12.0	11.9	11.9	11.8	11.8	11.7	11.6	11.6	11.5	11.5
11.4	11.3	11.3	11.2	11.2	11.1	11.1	11.0	11.0	10.9
10.9	10.8	10.8	10.7	10.7	10.6	10.6	10.5	10.4	10.4
10.3	10.3	10.2	10.2	10.1	10.0	10.0	9.9	9.8	9.8
9.7	9.6	9.5	9.4	9.3	9.2	9.1	9.0	8.9	8.8
8.7	8.6	8.5	8.4	8.3	8.2	8.0	7.9	7.8	7.7
7.6	7.5	7.4	7.2	7.1	7.0	6.9	6.8	6.7	6.6
6.5	6.4	6.3	6.2	6.1	6.0	5.9	5.8	5.7	5.7
5.6	5.5	5.4	5.4	5.3	5.2	5.2	5.1	5.1	5.1
5.0	5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.9	4.9
4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 30186. AT TIME 50.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	30186.	28748.	19862.	8491.	1248696.
CMS	855.	814.	562.	240.	35359.
INCHES		4.35	12.02	15.41	15.74
MM		110.45	305.24	391.46	399.78
AC-FT		14255.	39396.	50524.	51599.
THOUS CU M		17584.	48595.	62321.	63646.

STATION OUTFLO, PLAN 1, RATIO 9

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

11.	20.	27.	33.	37.	40.	43.	44.	45.	45.
45.	45.	44.	43.	42.	41.	39.	38.	36.	35.
33.	32.	30.	29.	27.	26.	24.	23.	22.	21.
19.	19.	20.	25.	36.	52.	75.	104.	138.	178.
223.	272.	325.	362.	387.	412.	438.	465.	503.	538.
572.	604.	632.	657.	678.	697.	712.	725.	736.	744.
751.	756.	760.	763.	767.	770.	775.	781.	789.	800.
812.	827.	845.	869.	899.	939.	991.	1054.	1133.	1335.
2186.	3538.	5304.	7399.	9802.	12430.	15207.	18083.	21001.	23905.
26730.	29411.	31883.	34092.	35995.	37564.	38784.	39645.	40141.	40266.
40038.	39513.	38760.	37837.	36796.	35687.	34544.	33392.	32245.	31114.
30006.	28923.	27870.	26848.	25858.	24899.	23973.	23079.	22217.	21386.
20587.	19817.	19076.	18363.	17676.	17016.	16381.	15770.	15182.	14617.

SH 25

14073.	13545.	13032.	12540.	12067.	11613.	11175.	10756.	10355.	9969.
9599.	9244.	8902.	8573.	8256.	7953.	7662.	7382.	7112.	6852.
6602.	6360.	6128.	5905.	5690.	5482.	5283.	5091.	4905.	4725.
4551.	4382.	4219.	4061.	3909.	3762.	3620.	3483.	3352.	3225.
3103.	2986.	2864.	2732.	2596.	2459.	2328.	2202.	2083.	1970.
1864.	1764.	1671.	1585.	1505.	1432.	1366.	1306.	1255.	1213.
1188.	1175.	1161.	1147.	1132.	1116.	1099.	1082.	1064.	1046.
1027.	1008.	988.	967.	945.	924.	902.	880.	857.	835.
812.	788.	761.	735.	709.	683.	658.	632.	607.	582.
558.	535.	512.	490.	468.	451.	436.	422.	407.	393.
379.	365.	351.	321.	292.	264.	239.	216.	195.	176.
158.	142.	128.	115.	104.	93.	84.	75.	68.	61.
55.	49.	44.	40.	36.	32.	29.	26.	24.	22.
20.	18.	16.	15.	13.	12.	11.	10.	9.	8.
8.	7.	6.	6.	5.	5.	5.	4.	4.	4.
3.	3.	3.	3.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				STORAGE					
3.	6.	8.	10.	11.	12.	13.	13.	14.	14.
14.	14.	13.	13.	13.	12.	12.	11.	11.	11.
10.	10.	9.	9.	8.	8.	7.	7.	7.	6.
6.	6.	6.	8.	11.	16.	23.	32.	44.	58.
73.	91.	111.	133.	157.	183.	211.	239.	269.	298.
326.	352.	376.	398.	417.	434.	449.	461.	471.	479.
485.	490.	494.	497.	501.	504.	509.	515.	523.	534.
548.	565.	587.	616.	655.	707.	778.	873.	1001.	1168.
1374.	1610.	1871.	2152.	2449.	2759.	3076.	3397.	3717.	4032.
4336.	4624.	4889.	5126.	5330.	5498.	5629.	5721.	5775.	5788.
5764.	5707.	5626.	5527.	5416.	5297.	5174.	5051.	4928.	4807.
4688.	4572.	4459.	4349.	4242.	4139.	4039.	3942.	3849.	3759.
3672.	3587.	3506.	3428.	3352.	3279.	3208.	3139.	3073.	3009.
2948.	2887.	2829.	2772.	2717.	2664.	2612.	2563.	2516.	2470.
2425.	2382.	2340.	2300.	2260.	2222.	2185.	2150.	2115.	2081.
2048.	2015.	1984.	1954.	1924.	1896.	1868.	1840.	1814.	1788.
1763.	1738.	1714.	1691.	1668.	1645.	1623.	1601.	1580.	1559.
1539.	1519.	1499.	1476.	1451.	1426.	1401.	1377.	1353.	1330.
1307.	1285.	1263.	1241.	1220.	1199.	1178.	1158.	1137.	1117.
1095.	1073.	1049.	1024.	998.	972.	944.	917.	888.	860.
831.	802.	773.	744.	715.	687.	658.	630.	602.	575.
548.	521.	495.	470.	446.	422.	399.	377.	355.	334.
314.	295.	276.	258.	241.	225.	209.	193.	178.	163.
149.	136.	122.	110.	98.	88.	79.	71.	63.	56.
50.	45.	40.	36.	32.	29.	26.	23.	21.	19.
17.	15.	14.	12.	11.	10.	9.	8.	7.	7.
6.	5.	5.	4.	4.	4.	3.	3.	3.	3.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
				STAGE					
4.8	4.8	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9
4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.9	4.9	5.0	5.0	5.1	5.3
5.4	5.5	5.7	5.8	6.0	6.2	6.3	6.5	6.7	6.9
7.0	7.1	7.3	7.4	7.5	7.6	7.6	7.7	7.7	7.8
7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	8.0	8.0
8.1	8.1	8.2	8.3	8.5	8.7	9.0	9.3	9.7	10.2
10.8	11.4	12.1	12.8	13.5	14.2	14.9	15.6	16.2	16.8
17.4	17.9	18.3	18.7	19.1	19.3	19.6	19.7	19.8	19.8
19.8	19.7	19.6	19.4	19.2	19.0	18.8	18.6	18.4	18.2

SH 26

18.0	17.8	17.6	17.4	17.2	17.0	16.8	16.6	16.5	16.3
16.1	15.9	15.8	15.6	15.5	15.3	15.2	15.0	14.9	14.8
14.6	14.5	14.4	14.2	14.1	14.0	13.9	13.8	13.7	13.6
13.5	13.4	13.3	13.2	13.1	13.0	12.9	12.8	12.7	12.6
12.6	12.5	12.4	12.3	12.3	12.2	12.1	12.0	12.0	11.9
11.8	11.8	11.7	11.7	11.6	11.5	11.5	11.4	11.4	11.3
11.2	11.2	11.1	11.1	11.0	10.9	10.9	10.8	10.7	10.7
10.6	10.5	10.5	10.4	10.4	10.3	10.2	10.2	10.1	10.1
10.0	9.9	9.8	9.8	9.7	9.6	9.5	9.4	9.3	9.2
9.1	9.0	8.9	8.8	8.7	8.6	8.5	8.4	8.3	8.2
8.1	7.9	7.8	7.7	7.6	7.5	7.4	7.3	7.2	7.1
6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	6.0
5.9	5.9	5.8	5.7	5.6	5.5	5.4	5.4	5.3	5.3
5.2	5.2	5.1	5.1	5.0	5.0	5.0	5.0	4.9	4.9
4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

PEAK OUTFLOW IS 40266. AT TIME 50.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	40266.	38358.	26569.	11333.	1664879.
CMS	1140.	1086.	752.	321.	47144.
INCHES		5.80	16.08	20.57	20.99
MM		147.37	408.31	522.49	533.03
AC-FT		19021.	52699.	67436.	68797.
THOUS CU M		23462.	65003.	83181.	84859.

SH 27

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .02	RATIO 2 .04	RATIO 3 .06	RATIO 4 .08	RATIO 5 .10	RATIO 6 .25	RATIO 7 .50	RATIO 8 .75	RATIO 9 1.00
HYDROGRAPH AT	INFLOW	61.50	1	830.	1660.	2490.	3319.	4149.	10373.	20746.	31119.	41492.
		(159.28)		(23.50)(	47.00)(	70.50)(	93.99)(	117.49)(	293.73)(	587.47)(	881.20)(	1174.93)
ROUTED TO	OUTFLO	61.50	1	559.	988.	1592.	2567.	3495.	9872.	20073.	30186.	40266.
		(159.28)		(15.82)(	27.98)(	45.08)(	72.69)(	98.97)(	279.55)(	568.39)(	854.78)(	1140.20)

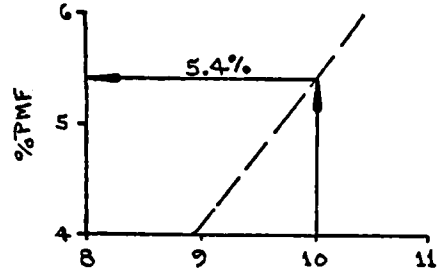
SH 28

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	4.75	4.75	10.00
STORAGE	0.	0.	1099.
OUTFLOW	0.	0.	1190.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.02	6.95	0.00	315.	559.	0.00	55.00	0.00
.04	8.94	0.00	774.	988.	0.00	56.50	0.00
.06	10.42	.42	1243.	1592.	12.00	56.00	0.00
.08	10.99	.99	1446.	2567.	19.00	53.50	0.00
.10	11.42	1.42	1603.	3495.	23.50	52.00	0.00
.25	13.54	3.54	2458.	9872.	39.00	50.50	0.00
.50	16.00	6.00	3615.	20073.	48.50	50.00	0.00
.75	18.02	8.02	4707.	30186.	52.50	50.00	0.00
1.00	19.81	9.81	5788.	40266.	55.50	50.00	0.00



SH29

APPENDIX

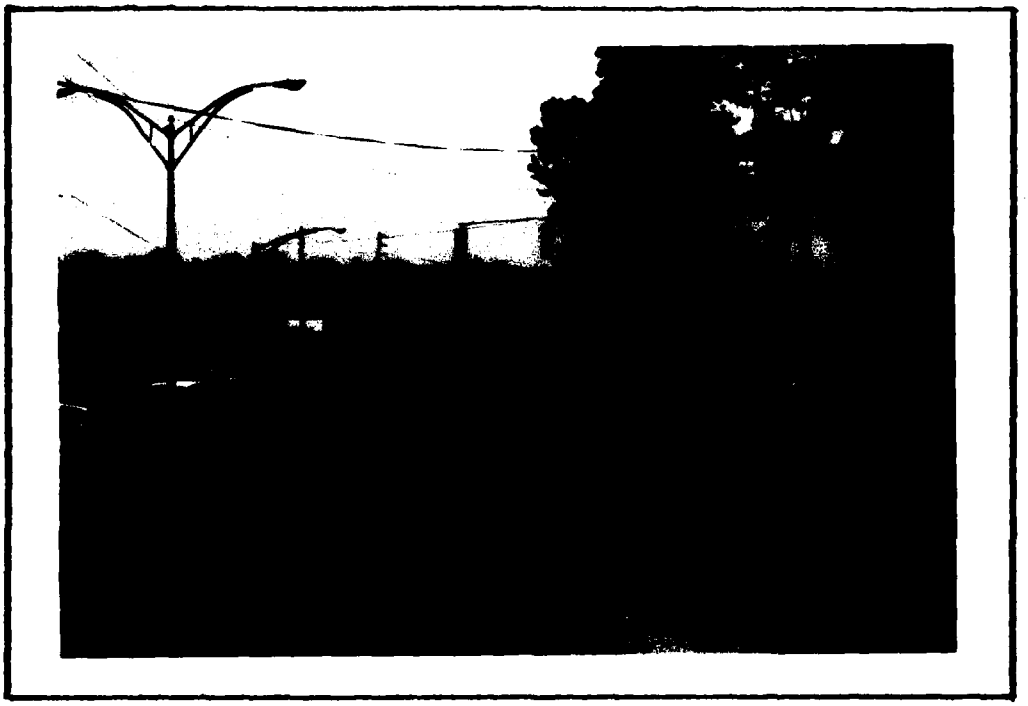
D

Photographs

ERODED SECTION
NEAR UPSTREAM EDGE OF CREST
9-27-79

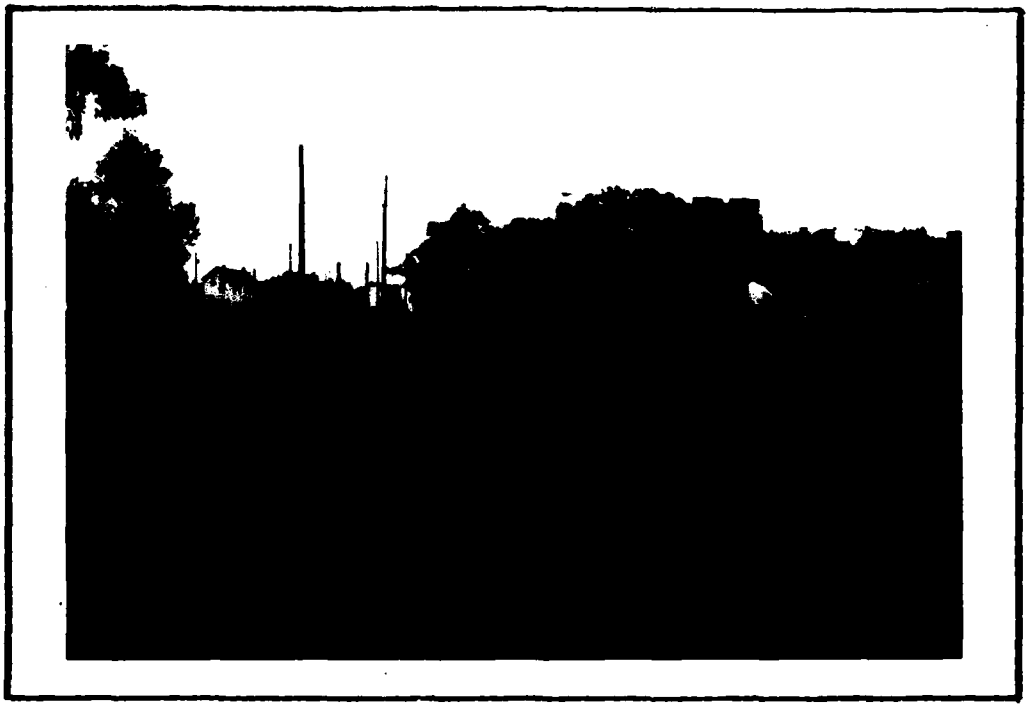
BREACHED SECTION THROUGH HIGHWAY
NEAR DOWNSTREAM EDGE OF CREST
9-27-79

PORTION OF WEIR AND STOPLOG BAY
9-27-79

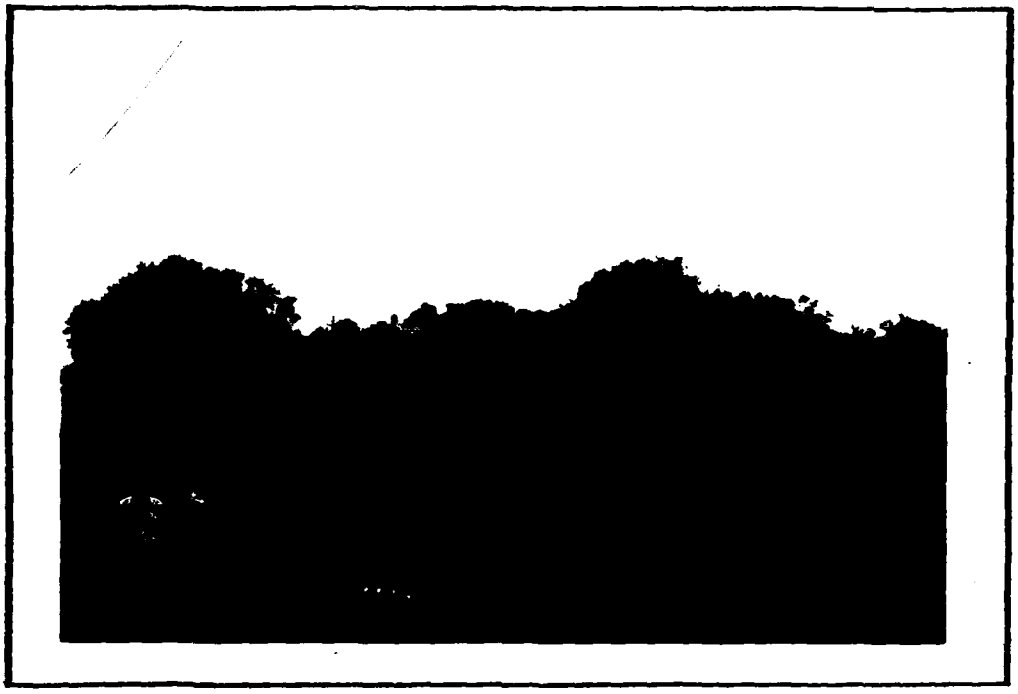


HIGHWAY ACROSS TOP OF EMBANKMENT
9-27-79

ERODED UPSTREAM SLOPE
TO LEFT OF SPILLWAY SECTION
9-27-79



OVERGROWTH ON DOWNSTREAM SLOPE OF DAM
9-27-79



HOUSES IN DOWNSTREAM DAMAGE AREA
9-27-79

TEMPORARY BRIDGE
ON DOWNSTREAM SIDE OF THE CREST
LOOKING TOWARD THE INDIAN RIVER
9-27-79

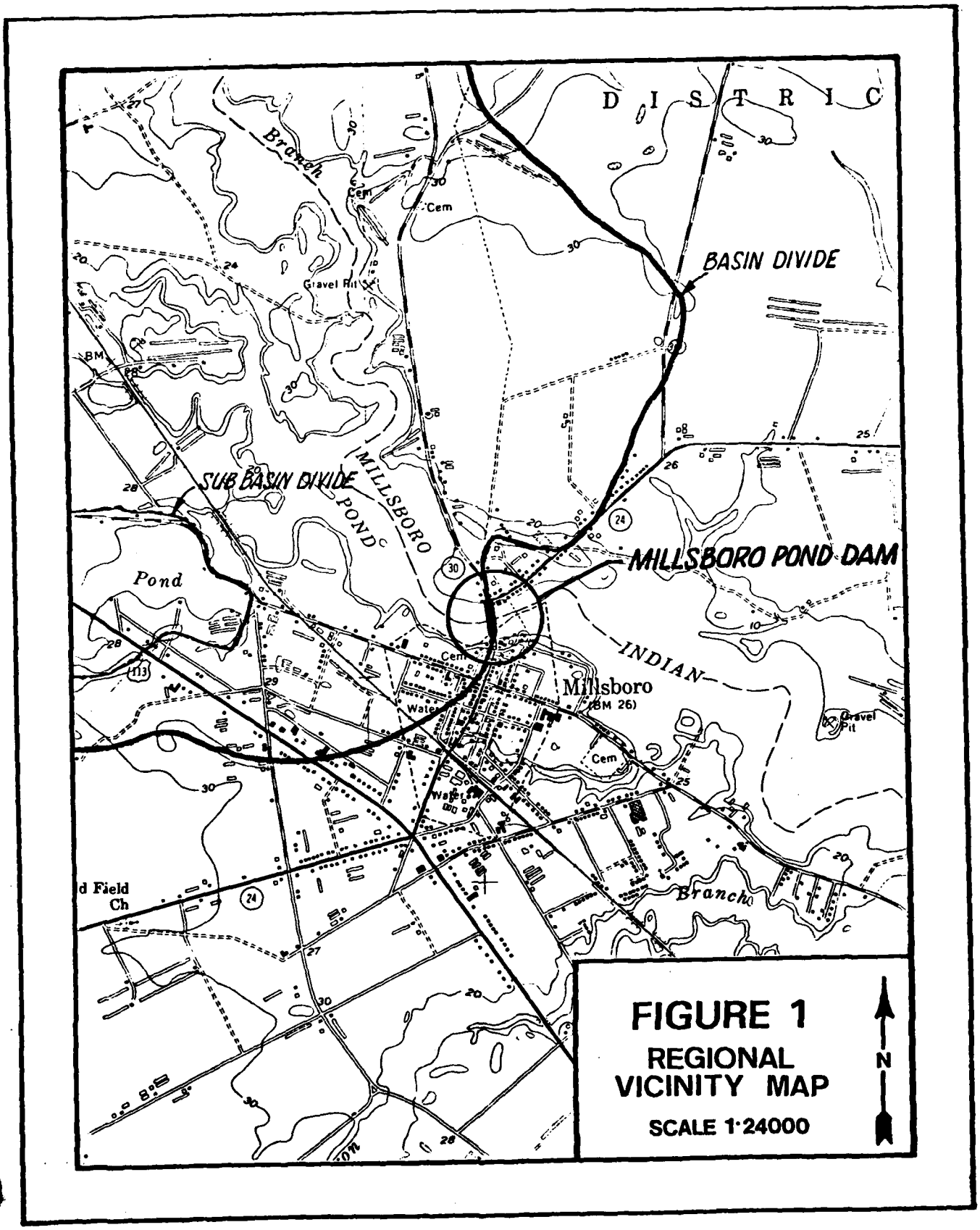
APPENDIX

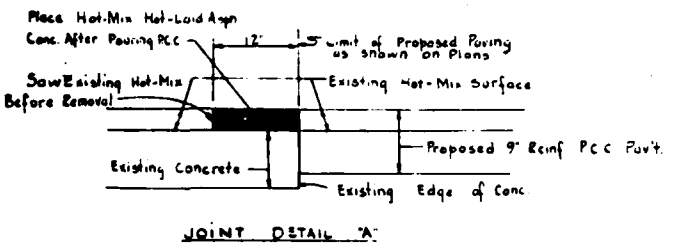
E

Drawings

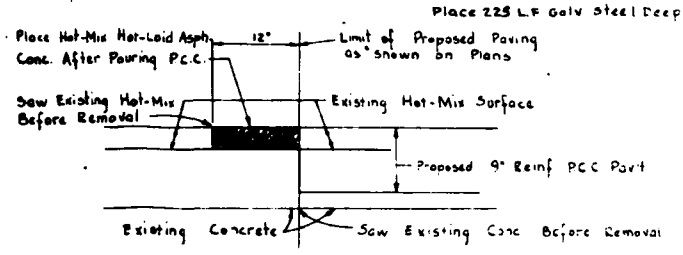
TABLE OF CONTENTS

APPENDIX E


D I S T R I C
BASIN DIVIDE
SUB BASIN DIVIDE
MILLSBORO POND
MILLSBORO POND DAM
INDIAN
Millsboro
(BM 26)
Gravel Pit
Cem
Water
Pond
Branch
d Field
Ch
BM
FIGURE 1
REGIONAL
VICINITY MAP
SCALE 1:24000
N



JOINT DETAIL "A"



JOINT DETAIL "B"

PAVING SYMBOLS

- 9" Reinf. Cement Conc. Pavement on 6" Select Borrow.
- Bituminous Surface Treatment on 6" Select Borrow.

PUBLIC UTILITIES	
Diamond State Telephone Co.	D S T Co HB/1
Delaware Power & Light Co	D P & L Co
Rural Electrification Assoc.	R E A Co 111/456

Sta 43+25 (Washington St.) to Sta 2+00 Lt Side.
Place 225 L.F. Galv Steel Deep Beam Guard Rail

Sta. 0-25 to Sta 2+00 Rt Side.
Place ~~225~~ 212 L.F. Galv Steel Deep Beam Guard Rail

Place 200 L.F. Plain Cement Conc Curb - Type I.
Place 800 S.F. 4" Plain Cem Conc Sidewalk

Begin Contract 1859

DATUM - 20

COUNTY	CONTRACT		STATE	FED. AID PROJECT NO.		SHEET NO.	TOTAL SHEETS
SUSSEX	1859	2	DEL.	F-167 (7)		5	17

MILLSBORO POND, BRIDGE & APPROACHES

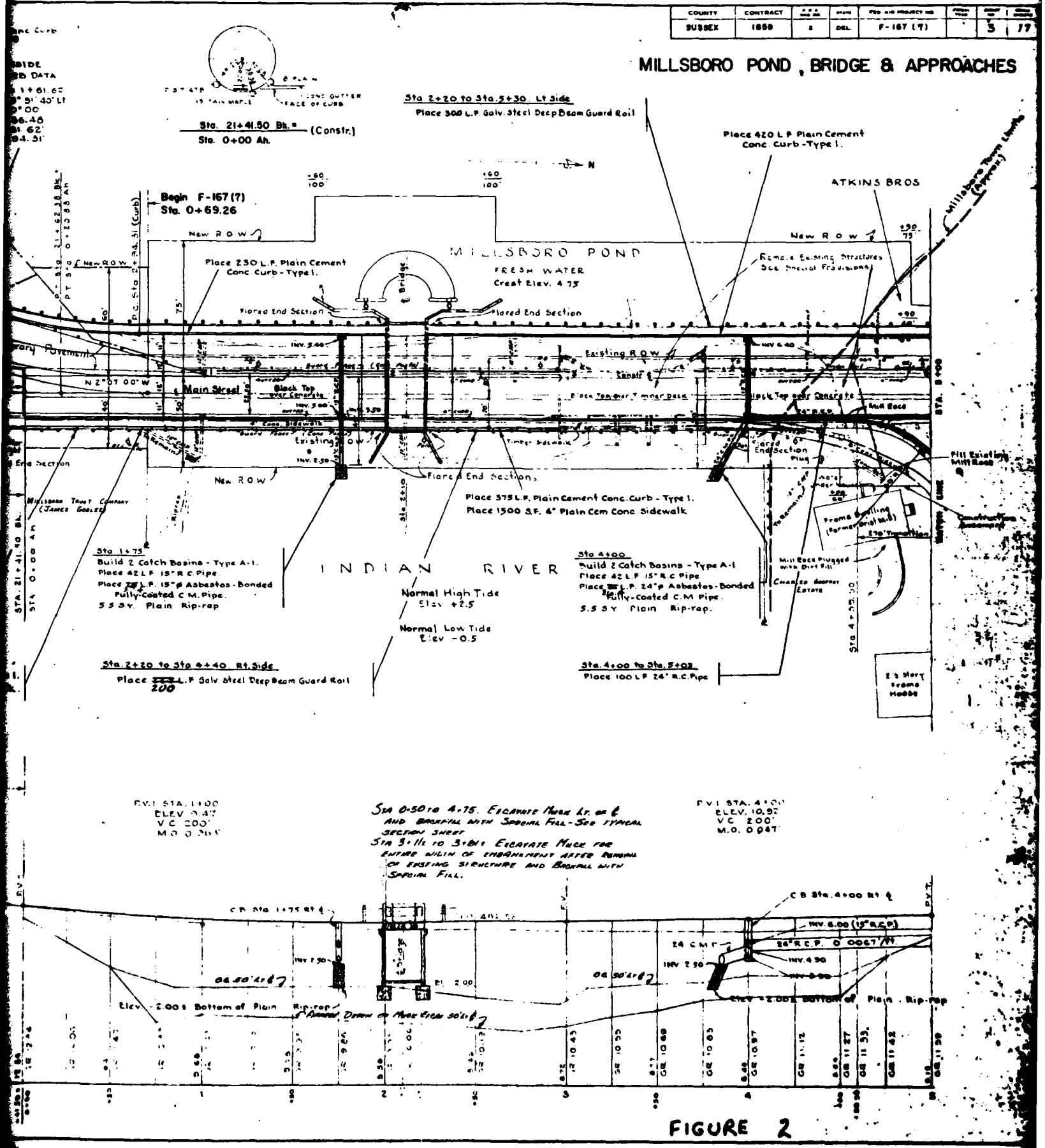
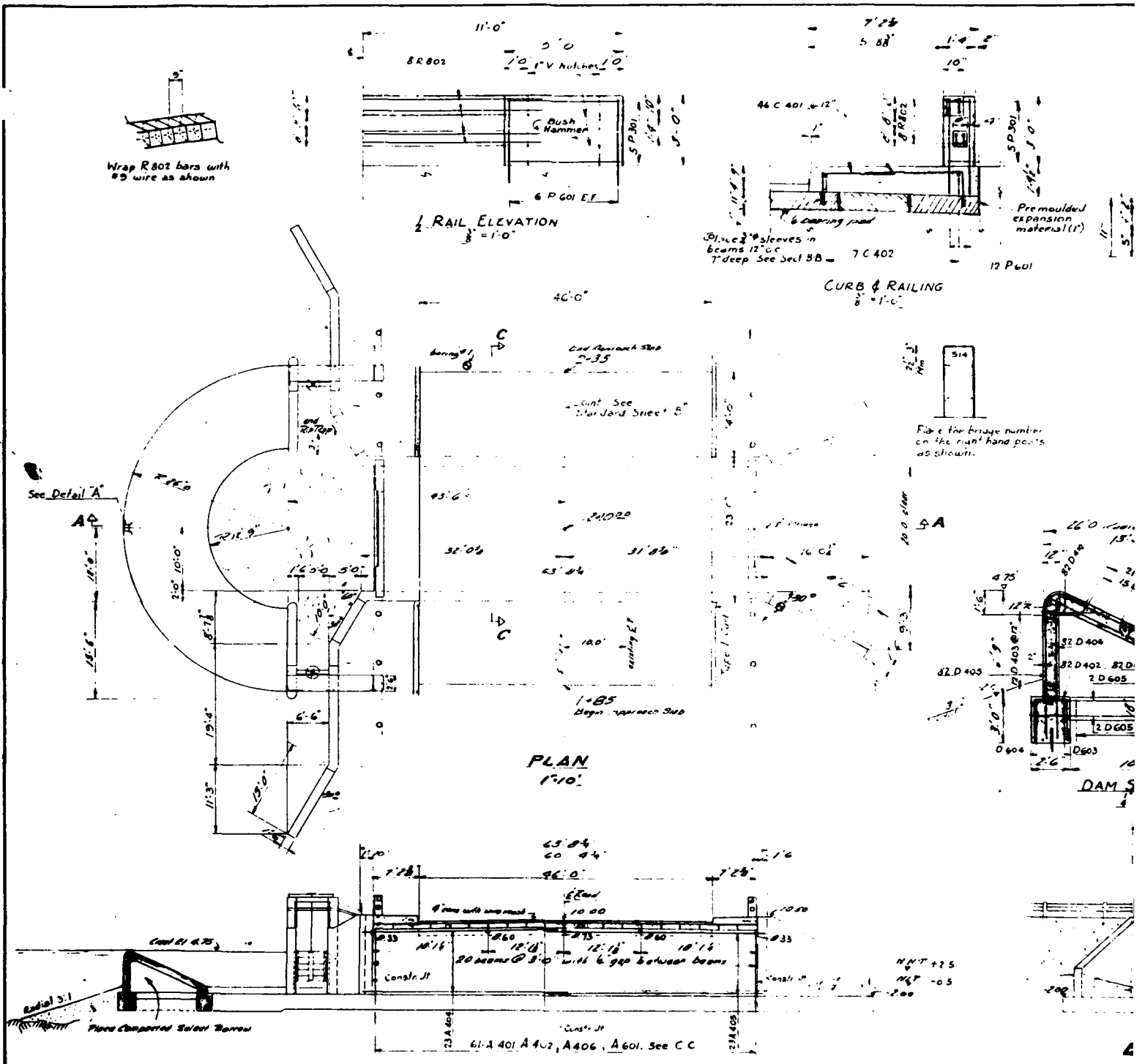
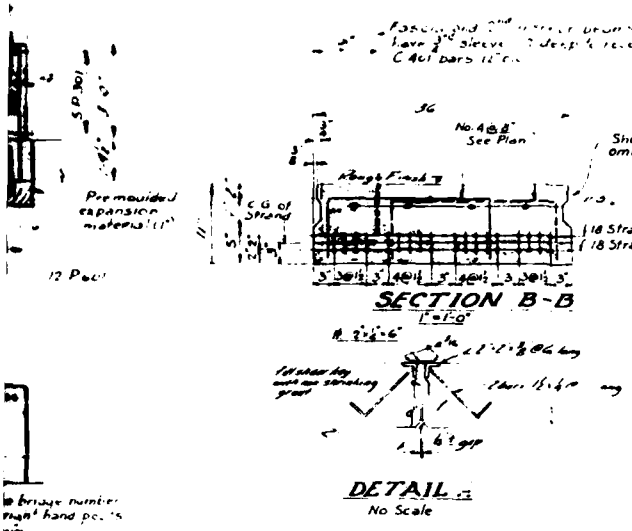


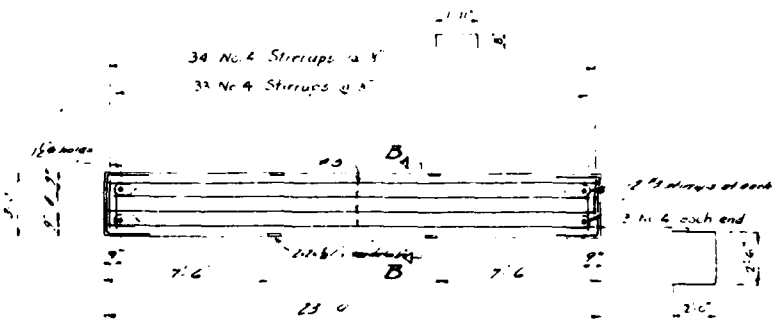
FIGURE 2


Wrap R802 bars with #9 wire as shown
8 R 802
11'-0"
5'-0"
10" V Notches
Bush Hammer
5 P 301
6 P 601 E.F.
1/2 RAIL ELEVATION
3/8" = 1'-0"
46 C 401 @ 12"
8 R 802
Premoulded expansion material (1/2)
Place 3/4" sleeves in beams 12" c.c. 1" deep See Sect BB
7 C 402
12 P 601
CURB & RAILING
3/8" = 1'-0"
46'-0"
Cont. See Standard Sheet 8"
See Detail "A"
Fix the bridge number on the right hand posts as shown.
S14
PLAN
1"=10'
Consln Jt
Place Compacted Select Borrow
61-A 401, A 402, A 406, A 601. See C C
SECTION A-A
1"=10'
DAM S

Sussex 1859 5 17

MILLSBORO POND DAM & BRIDGE





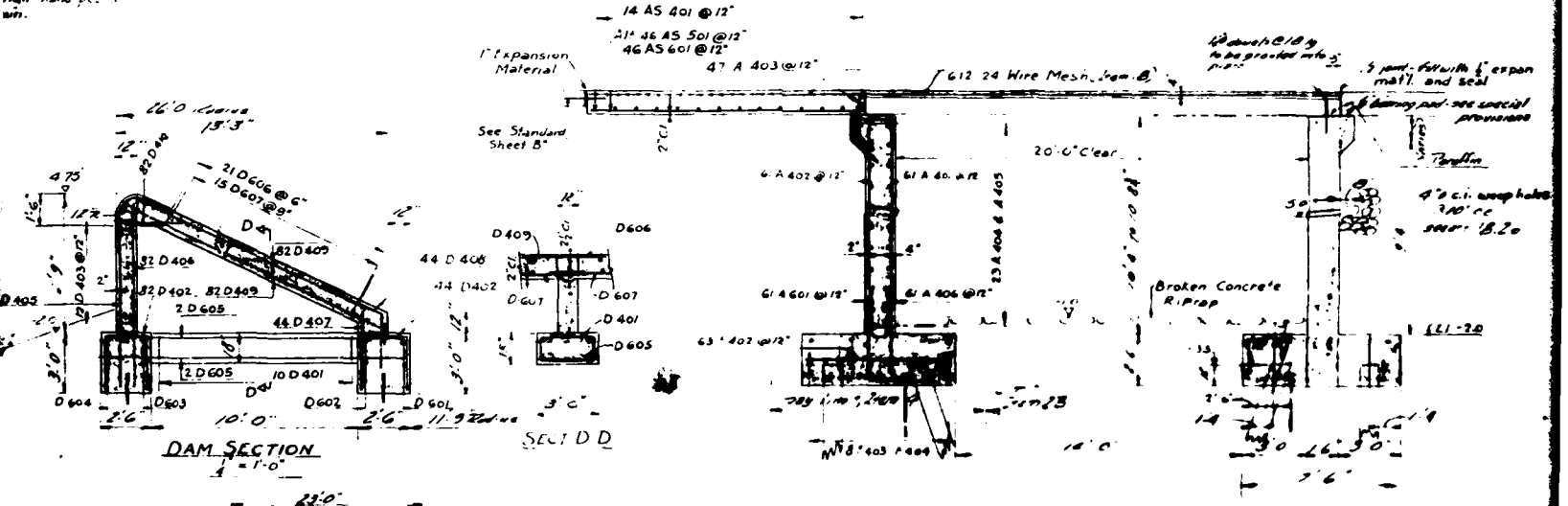
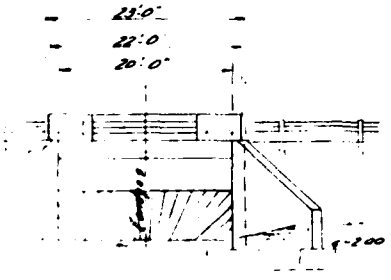
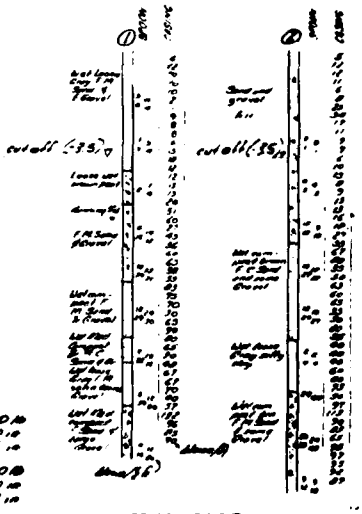


FIGURE 3





NOTES

Location See Sheet 1 of the contract plans
Specifications AASHO Specifications for Highway Bridges, 1961
DSHO Standard Specifications, 1966
Special Provisions of this contract

Loading H 20 S 16 44

Materials
Bar Reinforcement Intermediate Grade
Concrete Class A
Prestressing Strand 5/16" 7 wire stress relieved strand, f_s 250,000 p.s.i.
Concrete in Prestressed Beams, 5000 p.s.i. @ 28 days; 4000 at prestressing

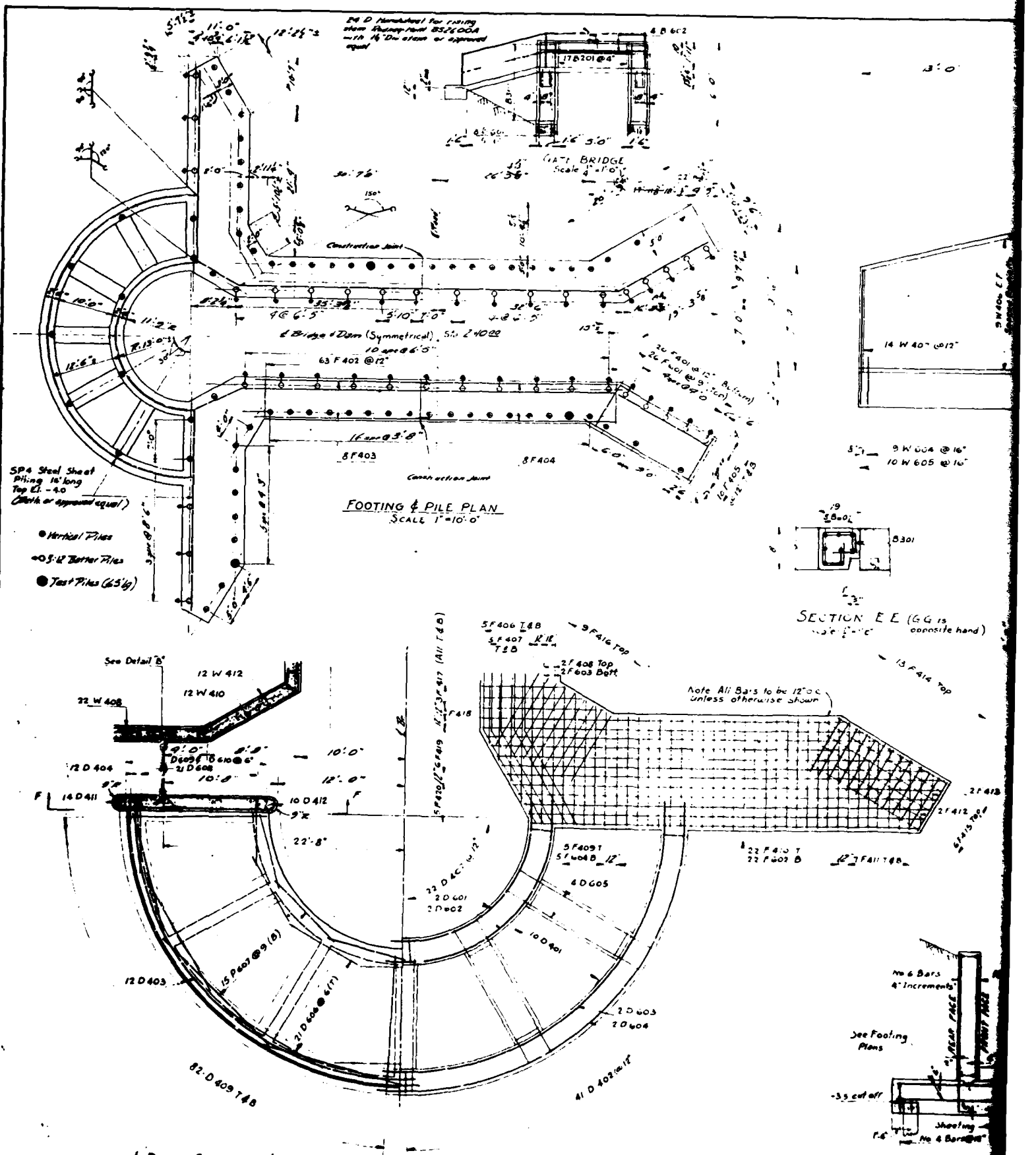
Piles Untreated Timber, 20 Tons bearing
Sheet piles, Flat steel interlock ¼ thick

Construction See Special Provisions
Beams must be in place & grouted before any backfill is placed Then both sides must be filled simultaneously & brought up to level

DELAWARE
STATE HIGHWAY DEPARTMENT

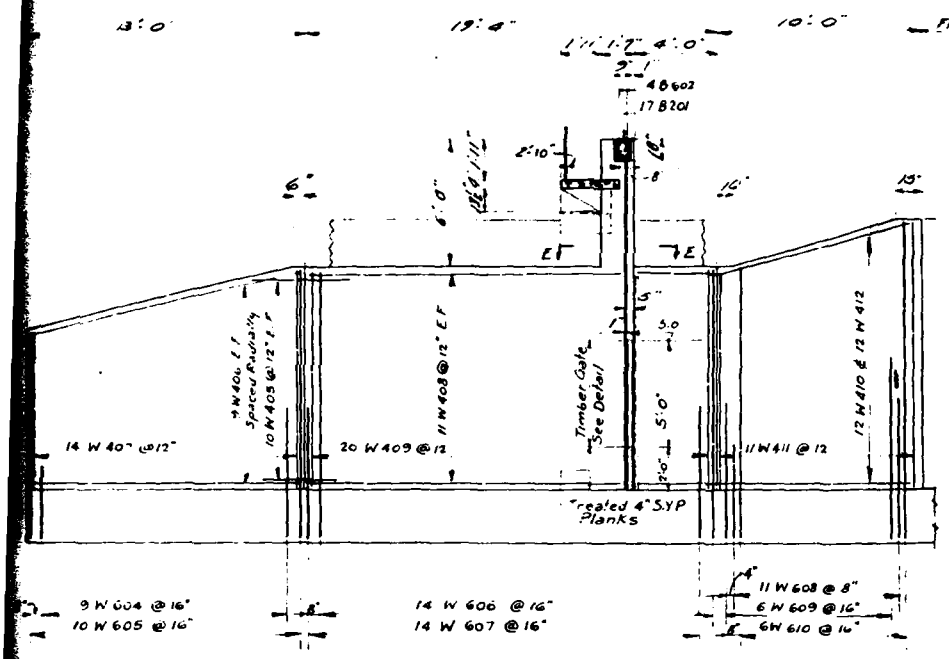
PLAN, ELEVATION, BORINGS
PRESTRESSED CONCRETE DECK SLAB BEAMS

D.R.B.S.	SCALE	APPROVED BY
T.A.M.R.	AS NOTED	J. M. Fox
C.C.R.N. 4/66		BRIDGE ENGINEER

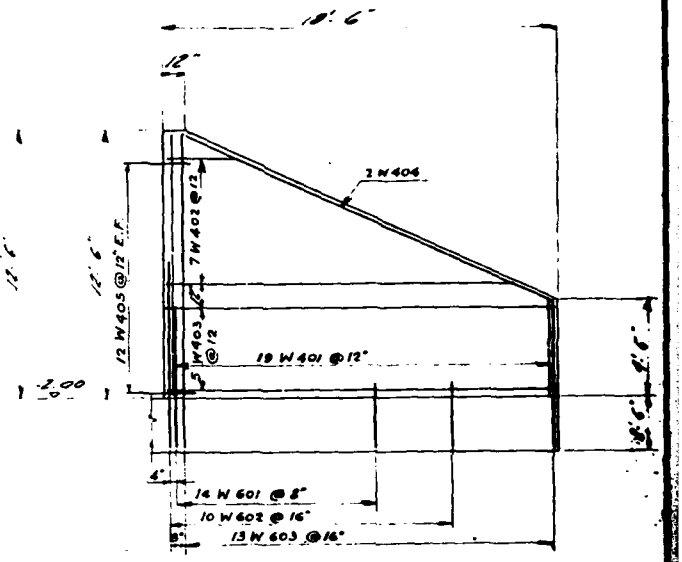

GATE BRIDGE
Scale 1"=1'0"
FOOTING & PILE PLAN
SCALE 1"=10'-0"
SP4 Steel Sheet Piling 16' long Top El. -4.0 (Wirth or approved equal)
Vertical Piles
3:12 Batter Piles
Test Piles (65' lg)
SECTION E E (GG is opposite hand)
Note All Bars to be 12" o.c. unless otherwise shown
See Detail 'B'
See Footing Plans
PLAN SPILLWAY & GATE
Scale 1"=1'0"
PLAN DAM & WING FOOTING
Scale 1"=1'0"

COUNTY	CONTRACT			FED. AID PROJECT NO.			
SUSSEX	1859		DEL.	F-167(7)		G	

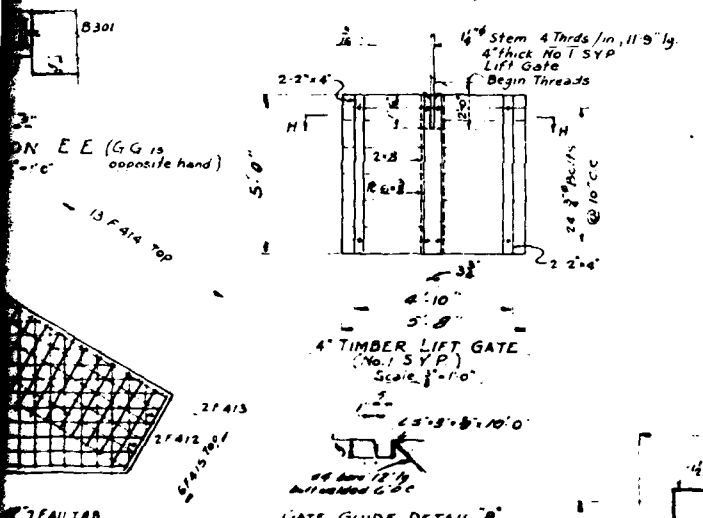
MILLSBORO POND DAM & BRIDGE



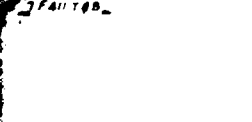
UPSTREAM WING WALLS (Developed)
Scale: 1/4" = 1'-0"



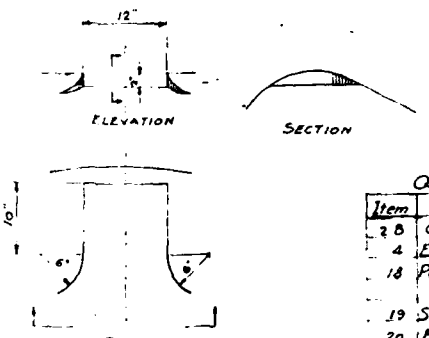
DOWNSTREAM WING WALLS
Scale: 1/4" = 1'-0"



4" TIMBER LIFT GATE
(No. 1 S.Y.P.)
Scale: 1/2"=1'-0"



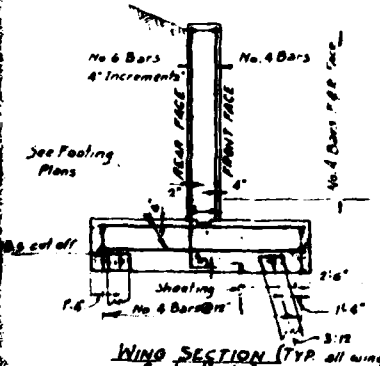
GATE GUIDE DETAIL "B"
Scale: 1"=1'-0"



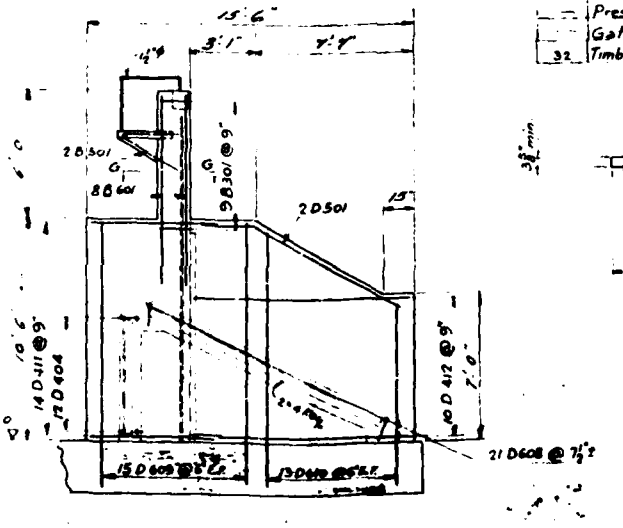
DETAIL "A"
No Scale

QUANTITIES FOR STRUCTURE

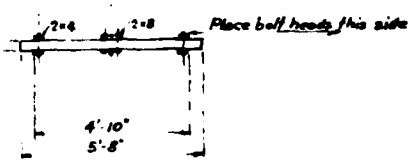
Item	Description	Amount
28	Channel Excavation	270 cy
4	Excavation for Structure	873 cy
18	Portland Cement Concrete Masonry	543 c.y.
19	Superficial Waterproofing	325 s.y.
20	Bar Reinforcement	35,000 Lbs
32	Timber Piles (Untreated)	4,905 L.F.
-	Steel Sheet Piles	6128 S.F.
34	Plain Riprap	262 s.y.
-	Prestressed Conc. Bridge Deck	L.S.
-	Gates & Accessories	L.S.
32	Timber Test Piles (Untreated)	165 L.F.



WING SECTION (TYP. all wings)
Scale: 1/2"=1'-0" See ELEVATIONS for bar designations



SECTION E.F.
Scale: 1/2"=1'-0"



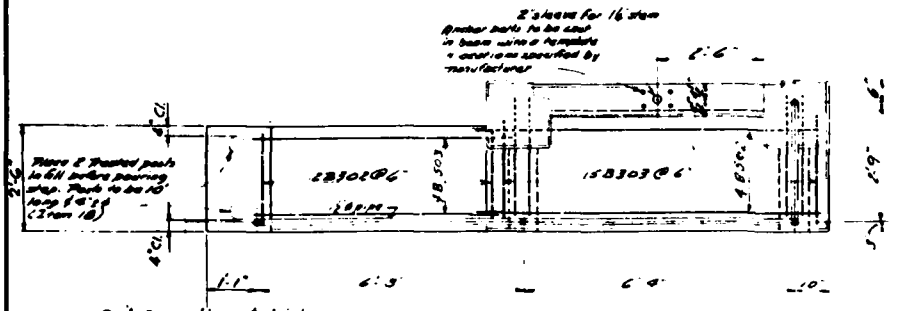
SECTION H.H
Scale: 1/2"=1'-0"

FIGURE 4

DELAWARE
STATE HIGHWAY DEPARTMENT

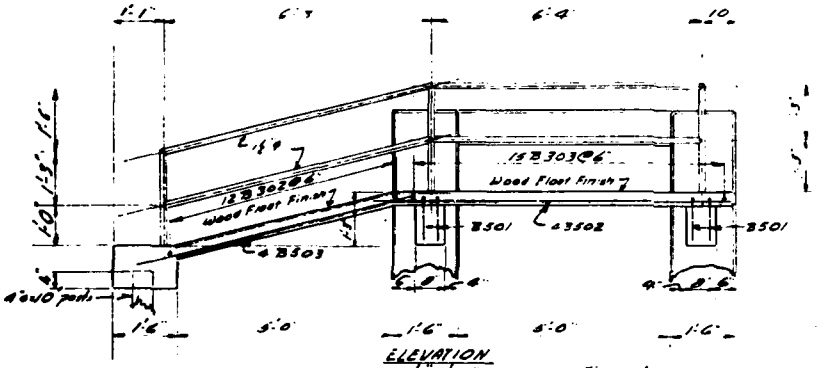
FOUNDATIONS, WINGWALLS & GATE DETAILS

D. R. & S. T. A. W. R. C. C. H. W. Co.	SCALE As NOTED	APPROVED BY:

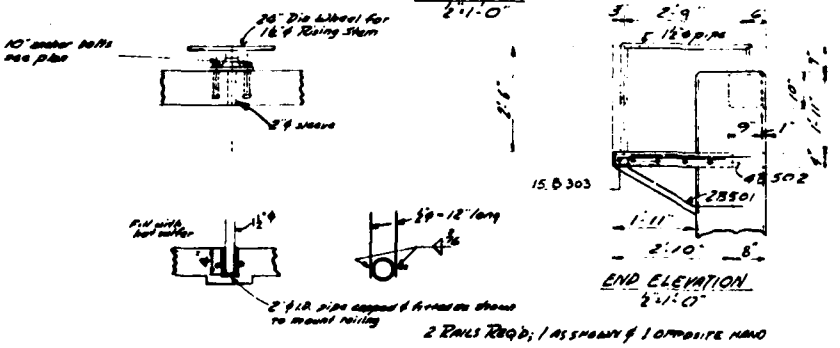


Rail Connections & Joints may be either screwed or welded. The completed rail shall be galvanized.

PLAN of GATE BRIDGE & RAIL
½"=1'-0"



ELEVATION
½"=1'-0"

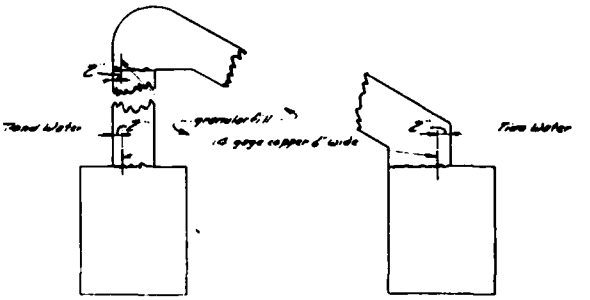


END ELEVATION
½"=1'-0"

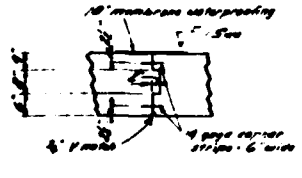
2 Rails Reqd; 1 As shown & 1 opposite hand

BILL OF BAR REINFOR

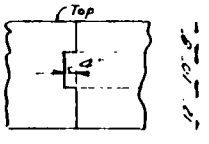
LOCATION & ARRANGEMENTS	MARK						LOCATION	MARK	
	A 4			13'-4	B		WINGS	W401	2-10
	A 402	122		6'-6"	S			W402	4-7
	A 403	94		3'-10"	B			W403	20
	A 404	44		36'-0"	S			W404	4
	A 405	44		34'-6"	S			W405	88
	A 406	122		4'-0"	S			W406	34
								W407	2-14
	A 601	122	6	7'-0"	S			W408	44
								W409	90
FOOTINGS	F 401	40	4	9'-0"	S			W410	24
	F 402	126		7'-0"	S			W411	22
	F 403	16		36'-6"	S			W412	24
	F 404	16		35'-6"	S				
	F 405	40		19'-0"	S				
	F 406	24		15'-6"	B				
	F 407	4+5		6'-0" to 13'-6"	S			W601	2-14
	F 408	4		14'-6"	S			W602	2-12
	F 409	2+5		10'-5⅛" to 11'-0"	S			W603	2-13
	F 410	44		[illegible]	S			W604	2-9
	F 411	4+7		[illegible]	S			W605	2-10
	F 412	4		5'-9"	S			W606	28
	F 413	4		3'-[illegible]	S			W607	28
	F 414	24		[illegible]	S			W608	2-11
	F 415	12		12'-0"	S			W609	2-6
	F 416	9		5'-0"	S			W610	2-6
	F 417	4+3		8'-0"to 11'-0"	S				
	F 418	4		34'-9"	S			A5401	56
	F 419	4+6		[illegible]	S			A5501	92
	F 420	4+5		[illegible]	S			A5601	92
	F 601	52	6	9'-0"	S		CURB & RAIL	C401	92
	F 602	44		10'-6"	S			C402	14
	F 603	44		14'-6"	S			P301	20
	F 604	2+5		[illegible]	S			P601	48
								R802	16



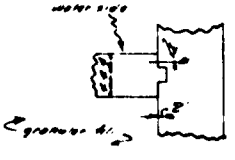
Construction Joints in Circular Spillway



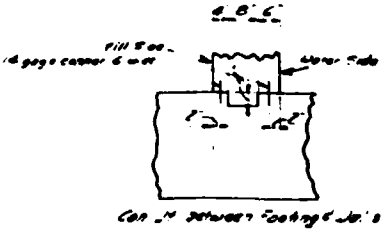
Construction Joint in Vertical Walls



Construction Joints in Footings



Joints in Spillway Slabs



Con. Jt. between Footing & Jamb

CONSTRUCTION JOINT DETAILS
No Scale

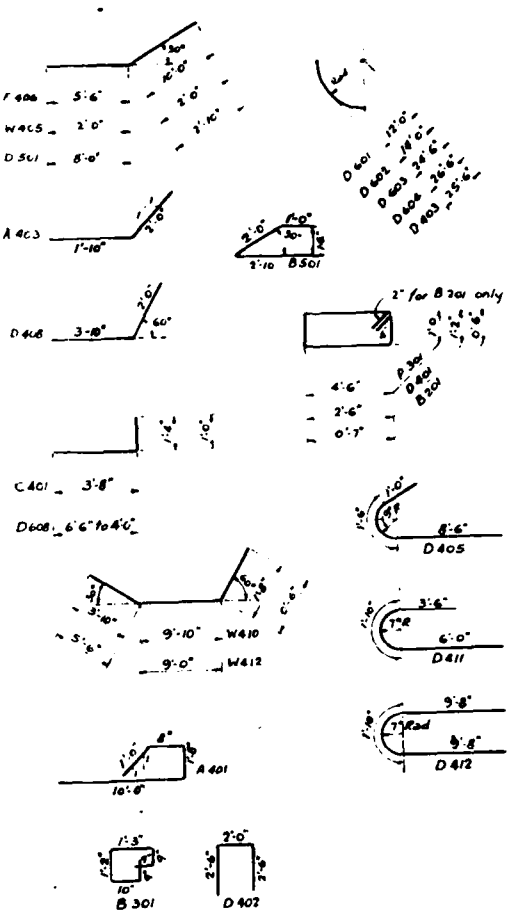
COUNTY	CONTRACT			FED. AID PROJECT NO.		SHEET NO.	
SUSSEX	1859			F-167(7)		7	

MILLSBORO POND DAM & BRIDGE

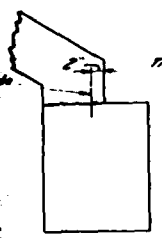
BILL OF BAR REINFORCEMENT

S or B	LOCATION	MARK	NO. OF PCS.	SIZE	LENGTH	S or B
B	WINGS	W401	2×19	4	13'-3" & 6'-3"	S
S		W402	4×7		16'-6" & 7'-3"	S
B		W403	20		18'-3"	S
S		W404	4		19'-0"	S
S		W405	88		4'-0"	B
S		W406	36		13'-0"	S
		W407	2×16		6'-10"& 10'-6"	S
S		W408	44		15'-0"	S
		W409	40		10'-6"	S
S		W410	24		15'-6"	B
S		W411	22		10'-6" & 19'-6"	S
S		W412	24		15'-0"	B
S						
S						
B						
S		W601	2×14	6	6'-6"& 4'-0"	S
S		W602	2×10		5'-0"& 14'-9"	S
S		W603	2×13		19'-8" & 4'-0"	S
S		W604	2×9		6'-0" & 9'-8"	S
S		W605	2×10		12'-6"	S
S		W606	28		12'-6"	S
S		W607	28		6'-6"	S
S		W608	2×11		4'-6" & 6'-6"	S
S		W609	2×6		8'-6" & 15'-6"	S
S		W610	2×6		14'-6"	S
S						
S	APPROACH SLAB	AS401	56	4	23'-0"	S
S		AS501	92	5	13'-3"	S
S		AS601	92	6	13'-3"	S
S	CURB & RAIL	C401	92	4	5'-0"	B
S		C402	14	4	22'-8"	S
S		P301	20	3	11'-8"	B
S		P601	48	6	4'-0"	S
		R802	16	8	15'-0"	S

LOCATION	MARK	NO. OF PCS.	SIZE	LENGTH	S or B
SPILL-WAY	D401	50	4	8'-0"	B
	D402	126		7'-0"	B
	D403	24		41'-0"	B
	D404	24		2'-6"	S
	D405	82		11'-0"	B
	D406	82		9'-0"	S
	D407	44		4'-3"	S
	D408	44		5'-4"	B
	D409	164		13'-0"	S
	D410	82		3'-6"	S
	D411	28		11'-6"	B
	D412	20		21'-2"	B
	D501	4	5	10'-10"	B
	D601	4	6	20'-0"	B
	D602	4		24'-0"	B
	D603	4		40'-6"	B
	D604	4		43'-6"	B
	D605	20		14'-6"	S
	D606	5×21		12'-0" & 7'-0"	S
	D607	6×15		13'-0" & 10'-0"	S
	D608	2×21		7'-6" & 9'-0"	B
	D609	60		12'-6"	S
	D610	4×13		12'-3" & 8'-6"	S
GATE BRIDGE	B201	34	2	2'-6"	B
	B301	36	3	5'-6"	B
	B501	8	5	6'-0"	B
	B502	8	5	8'-0"	S
	B601	32	6	6'-0"	S
	B602	8	6	7'-8"	S
	B302	24	3	2'-2"	S
	B303	30	3	2'-6"	S
	B503	8	5	7'-0"	S



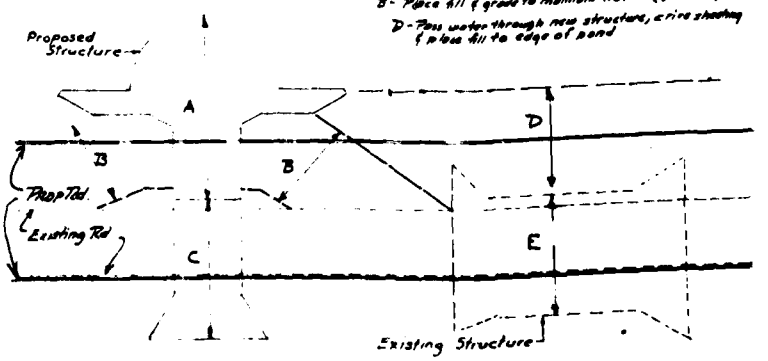
BAR BENDING DIAGRAMS & DETAILING DIMENSIONS
No Scale



A - Build from construction joint in abutments to wing walls.

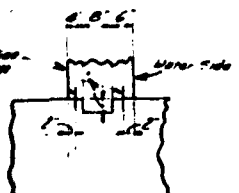
B - Place fill & grade to maintain traffic (1 Lane)

D - Pass water through new structure, drive sheeting & place fill to edge of pond



C - Build rest of Bridge & Finish Roadway

E - Remove existing structure & complete work



SUGGESTED CONSTRUCTION SEQUENCE

FIGURE 5

DELAWARE
STATE HIGHWAY DEPARTMENT

BILL OF BAR REINFORCEMENT

D. A.W.R.	SCALE	APPROVED BY:
T. A.W.R.		
C.C.R.R.		

APPENDIX

F

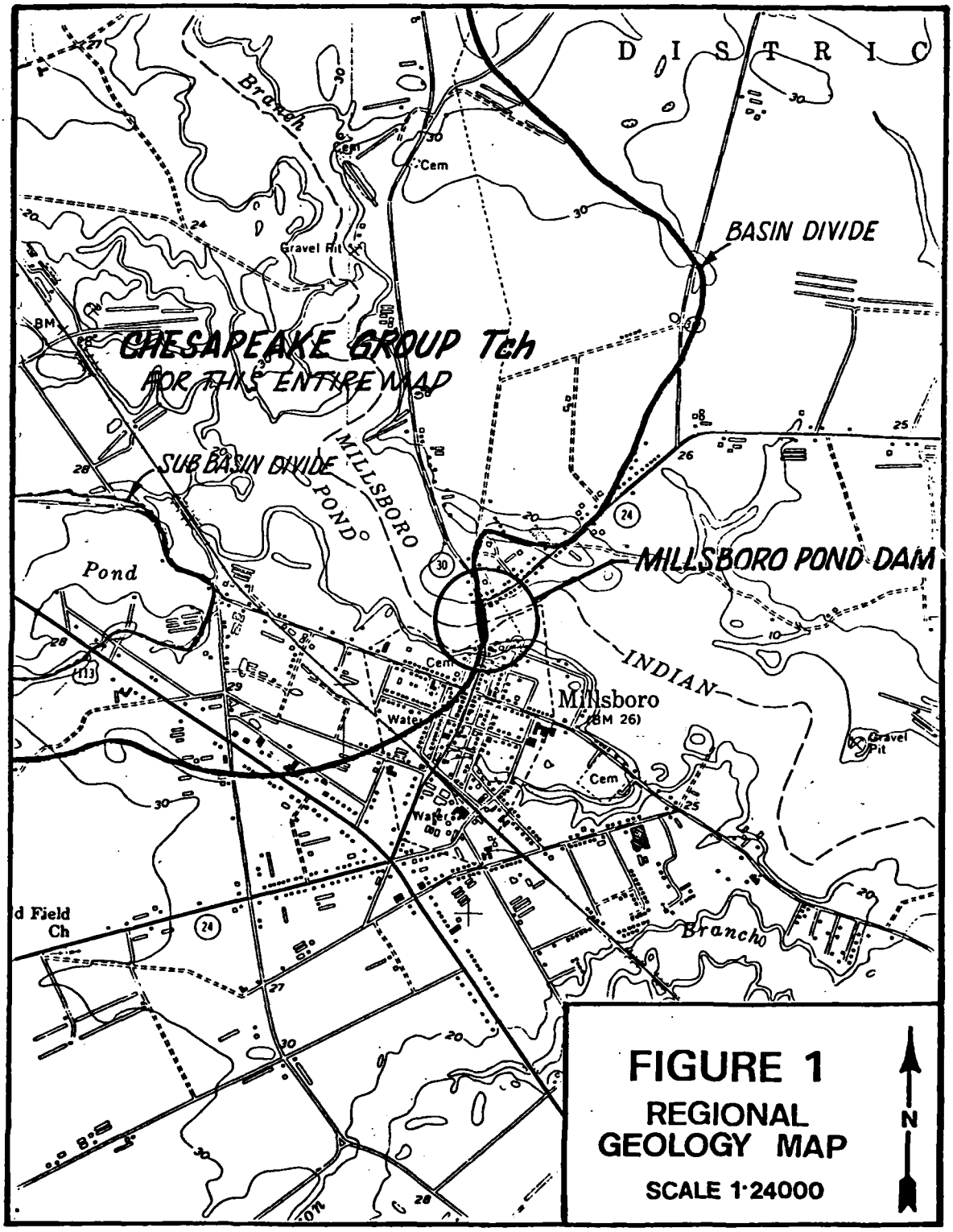
Site Geology

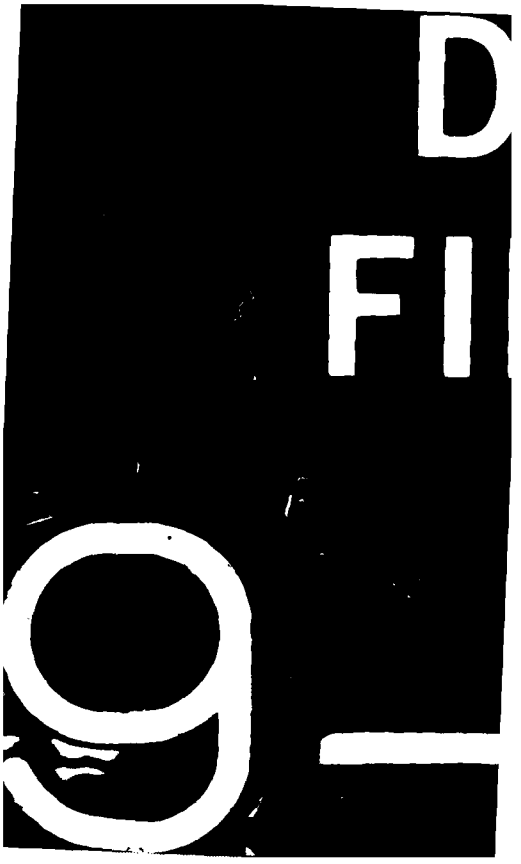
SITE GEOLOGY

MILLSBORO POND DAM

Millsboro Pond Dam is located in the Coastal Plain physiographic province which is composed of unconsolidated sedimentary deposits. These beds form a wedge-shaped mass that is exposed at the fall line and thickens in a southeasterly direction towards the Atlantic Ocean. This wedge-shaped mass consists largely of unconsolidated clays, silts, sands, and gravels which reach a thickness of more than 8,000 feet in southeastern Delaware.

The soils in the Millsboro area are of the Chesapeake Group which consists mainly of bluish gray silt with quartz sand and some shell beds.


BASIN DIVIDE
CHESAPEAKE GROUP Tch
FOR THIS ENTIRE MAP
SUB BASIN DIVIDE
MILLSBORO POND
MILLSBORO POND DAM
INDIAN
Millsboro
(BM 26)
Gravel Pit
Cem
Water
Branch
Pond
FIGURE 1
REGIONAL
GEOLOGY MAP
SCALE 1:24000
N


D
FI